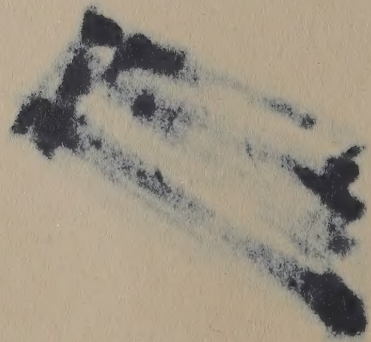
PROBLEMS IN WOODWORK

EDWARD F. WORST



PROBLEMS IN WOODWORK

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Foot-Power Loom Weaving

Industrial Work for the Middle Grades

Construction Work for the Primary Grades

Problems in Woodwork

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Chicago, Illinois

SECOND EDITION—ENLARGED

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by
Edward F. Worst

INTRODUCTION

THIS manual is designed as a guide to manual training teachers who believe that the object of education is the development of the child morally and mentally rather than the acquisition of skill, which so often is made the dominant feature in manual training. Not that the training to acquire skill should be neglected, but it should not be fostered at the expense of the child's broad understanding of nature and nature's laws.

No set of models can express the manual training idea, nor can any definite course of work be applicable to all the diverse conditions to be met with in one city, or even in one school; consequently, the exercises are arranged merely as a basis from which to work.

The fact that a variety of materials is used aids in bringing the work into closer relation with that of the grade teacher.

This relationship tends to instill life into the work of the shop, which should be considered as a school laboratory where the work of the classroom is to be more fully developed.

The emphasis placed on the combination of materials gives a broader view of the subject of manual training. It broadens the child's horizon so that he is capable of appreciating the unusual rather than the more commonplace problems so often imposed on pupils of manual training. The problems suggested are presented in such a way that the trained teacher will have no difficulty to understand their construction. The fact that so much detail is omitted gives the teacher an opportunity to present the detailed operations in his own way, thus making the work more individual.

EDWARD F. WORST.

Chicago, December 17, 1917.

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Problems in Woodwork

CHAPTER I

The Squaring Up Process

The first step in squaring up a piece of stock, is to get something to work from and that is usually a face, or the broadest and longest surface, of the piece of stock. If the piece of stock has been surfaced by machine all that is necessary to do is to take a few fine shavings off the face so that the planer marks may be removed. If this is done carefully and the board has not previously been warped, this is all that is necessary to get the face level. Mark this face with an "x." It is a wise plan not to give a beginner a warped or twisted piece of stock.

The second step is to plane an edge level and square with the face just planed. Mark this edge "x."

The third step is to plane an end square with both the face and edge marked "x." The fourth step is to mark the length with a rule, knife, and try square, and saw off all surplus stock $\frac{1}{8}$ in. from this line. Then plane down to this line and square with both the face and edge marked "x." The fifth step is to gauge the width from the edge marked "x" and plane the other edge down to this line square with both the face and the ends marked "x."

The last step is to gauge the thickness from the face marked "x" and plane the other face down to these gauged lines square with all edges and ends. Discourage the use of the pencil.

Solitaire

This game, as shown in No. 1, Fig. 3, is played by one person. Place 32 pegs on sticks, one in each hole, leaving the center hole "A" vacant. Then jump over any peg into an empty hole. Take away the peg which has been jumped. Repeat this operation until but one peg remains. The last jump must land the final peg in hole "A." Any peg may do jumping. Jump in a straight line only backward and

forward and right and left. The jump must be over one peg only into an empty hole. All jumps must be made in one straight line.

Nine Men Morris

This game as shown in No. 2, Fig. 3, is played by two persons. Each player has nine pegs. Player A puts a peg in any hole, then player B puts one in any other hole. They alternate turns. Each tries to get as many rows of three as he can, and also to spoil as many of his opponent's rows as he can. The pegs when once set cannot be moved around. The rows may be either vertical, horizontal or on the slant.

The one having the most rows of three wins the game.

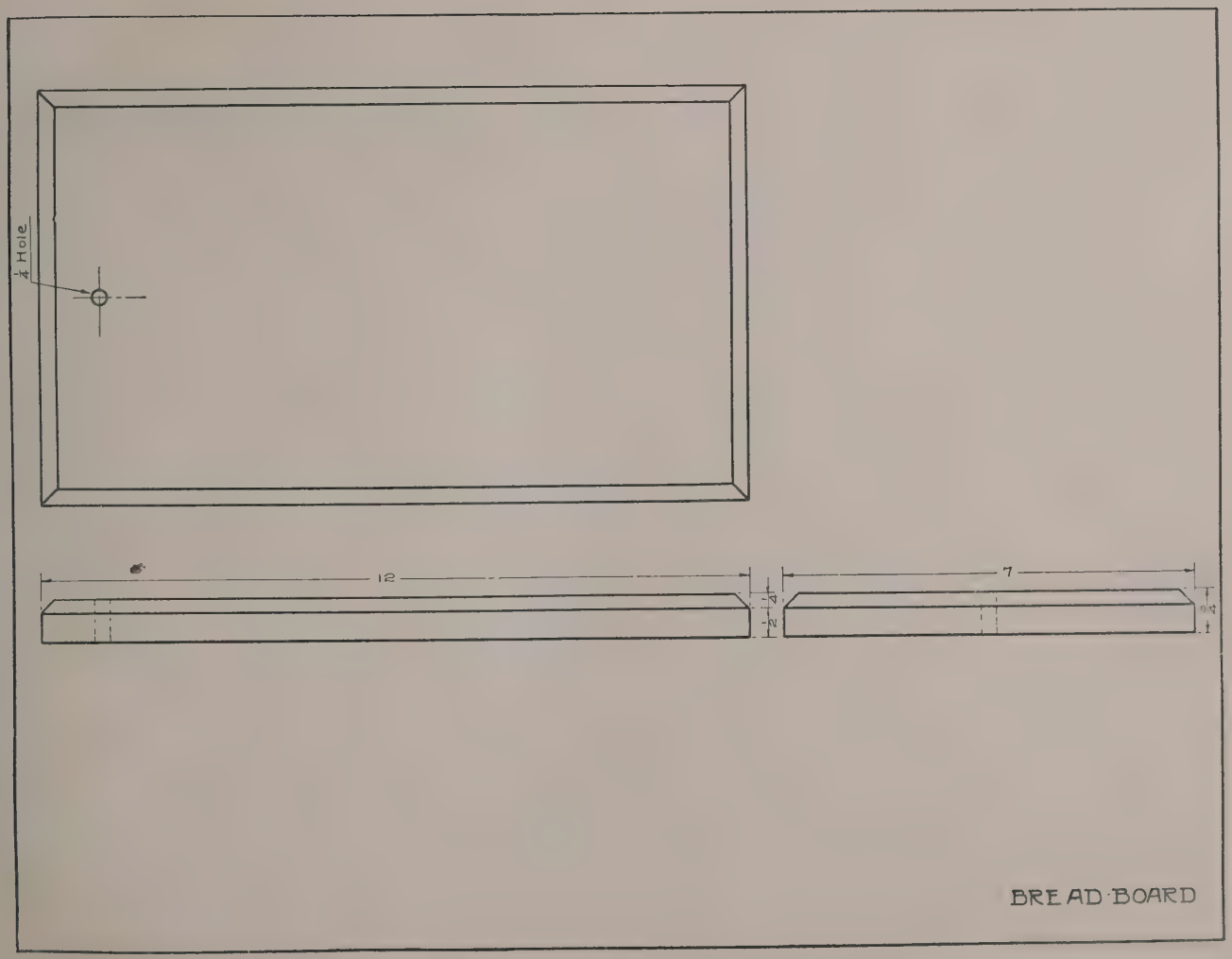


Fig. 1—Working Drawing of Bread Board (Sixth Grade)

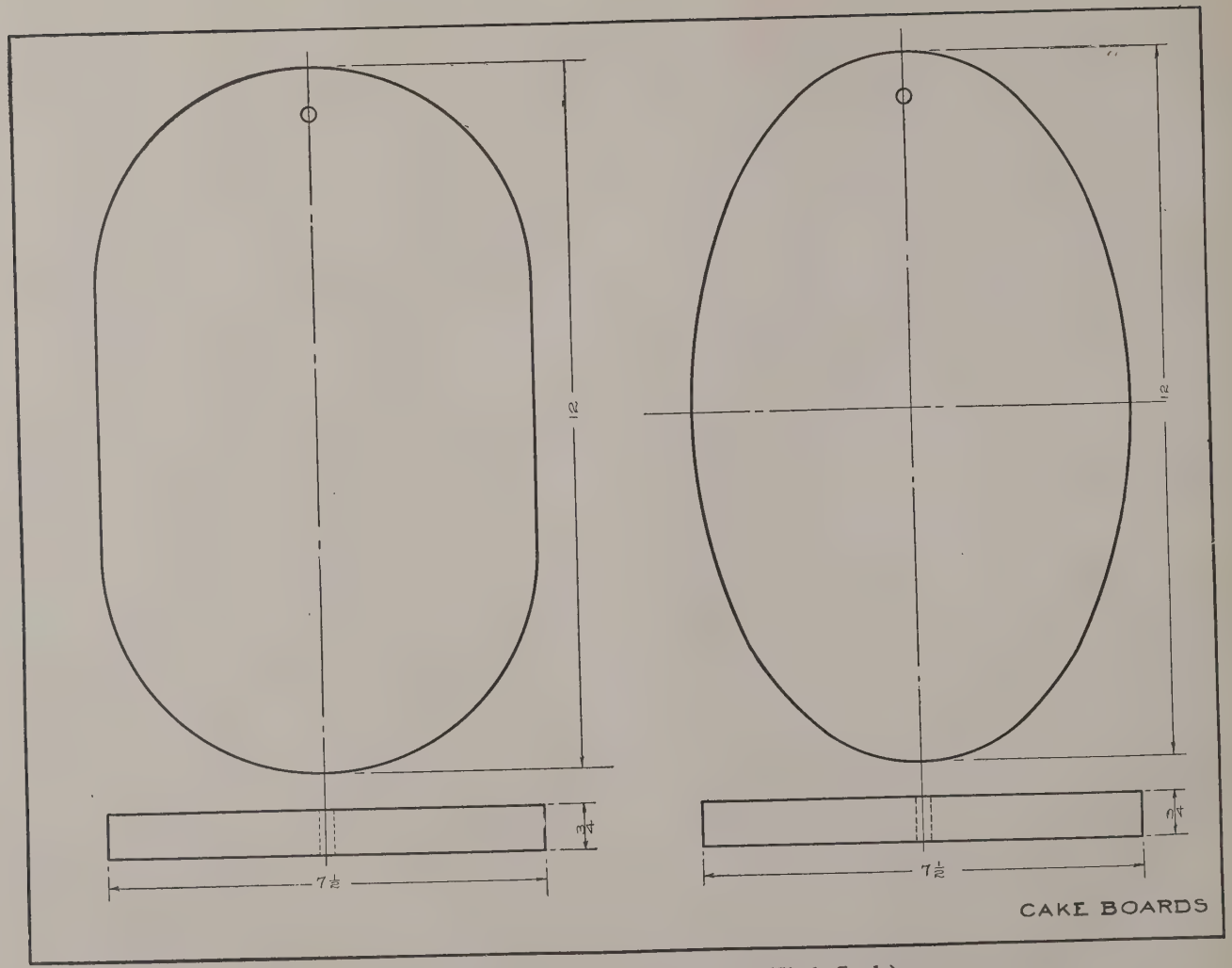


Fig. 2—Working Drawing of Cake Boards (Sixth Grade)

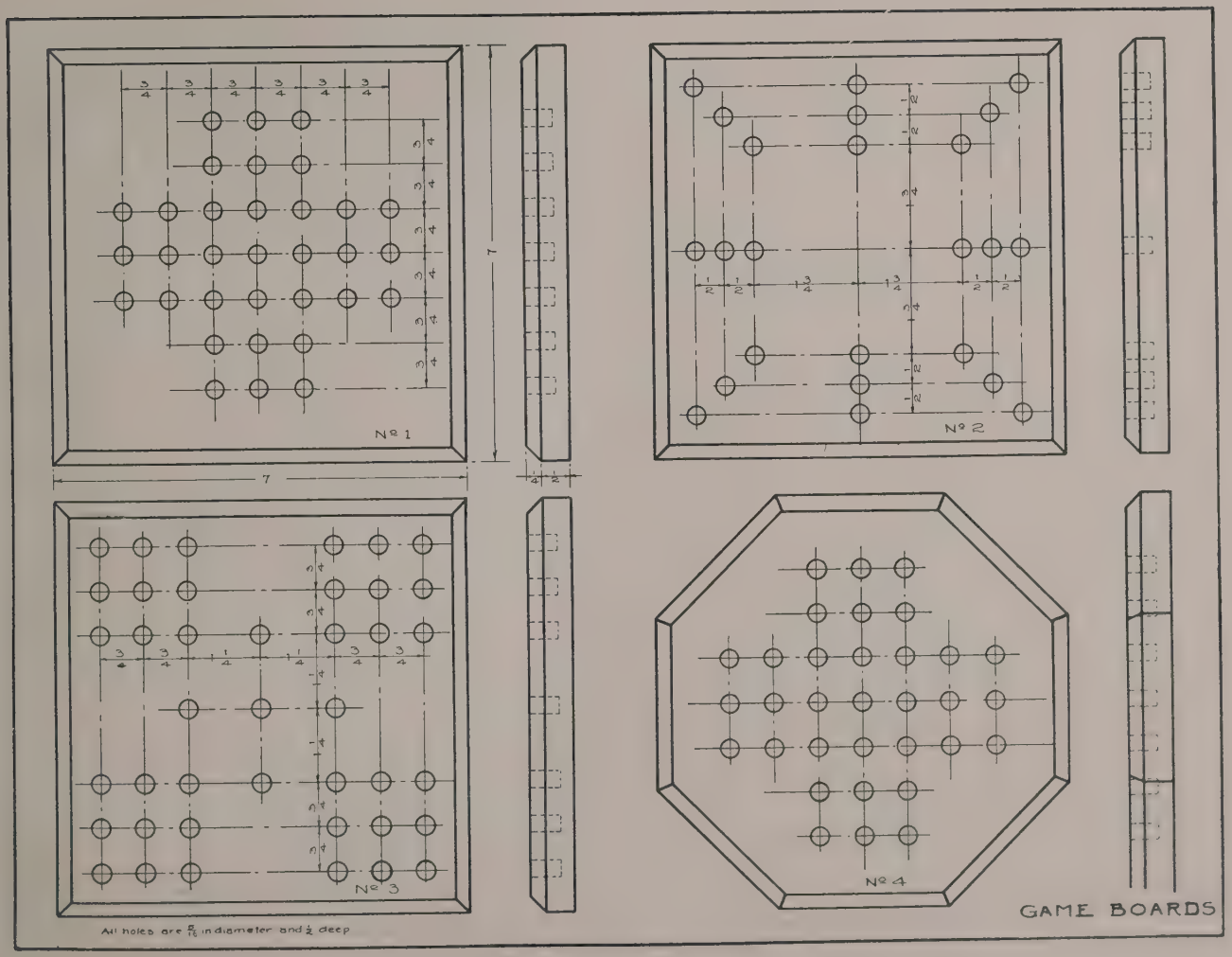


Fig. 3—Working Drawing of Game Boards (Sixth Grade)

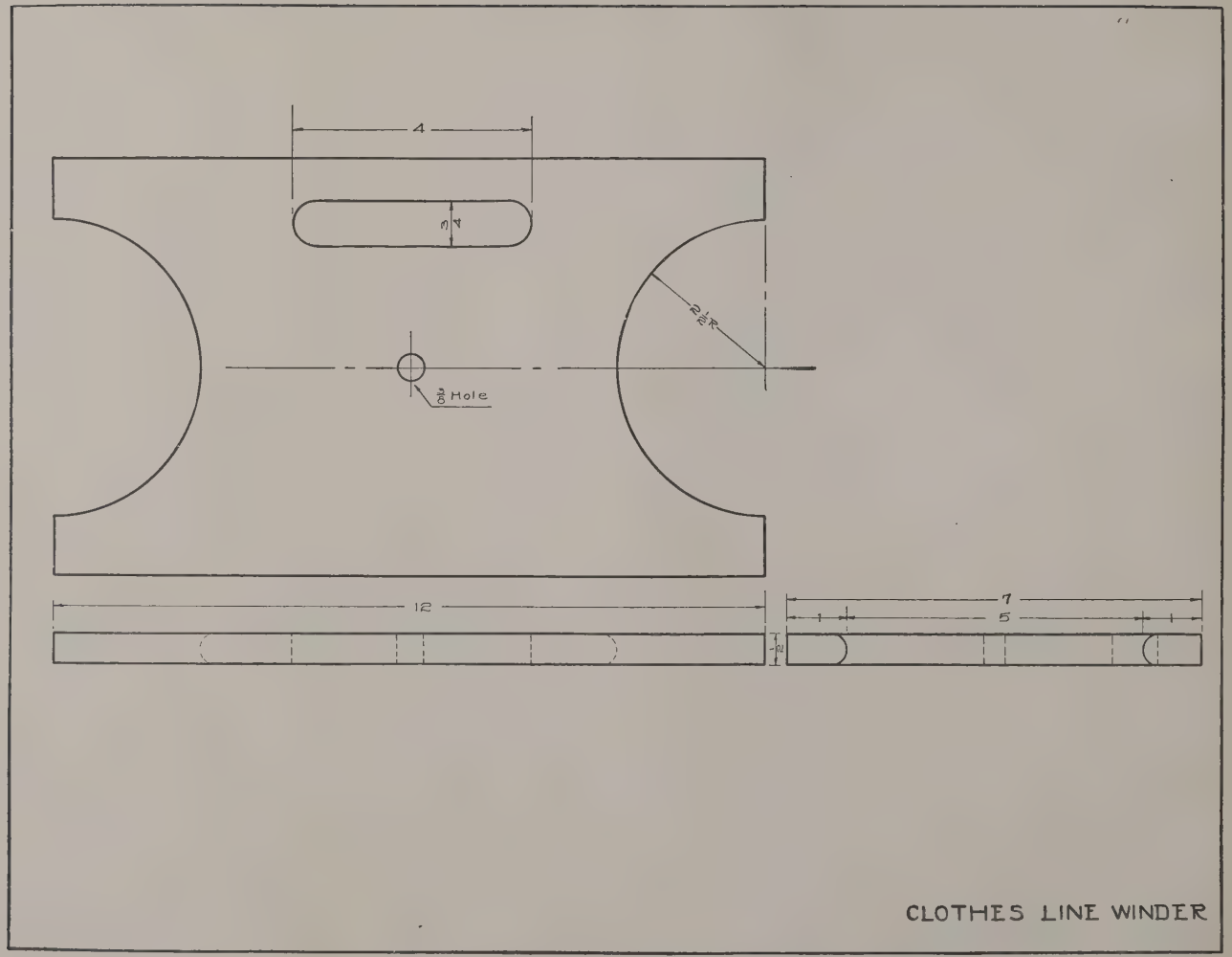


Fig. 4—Working Drawing for Clothes Line Winder (Sixth Grade)

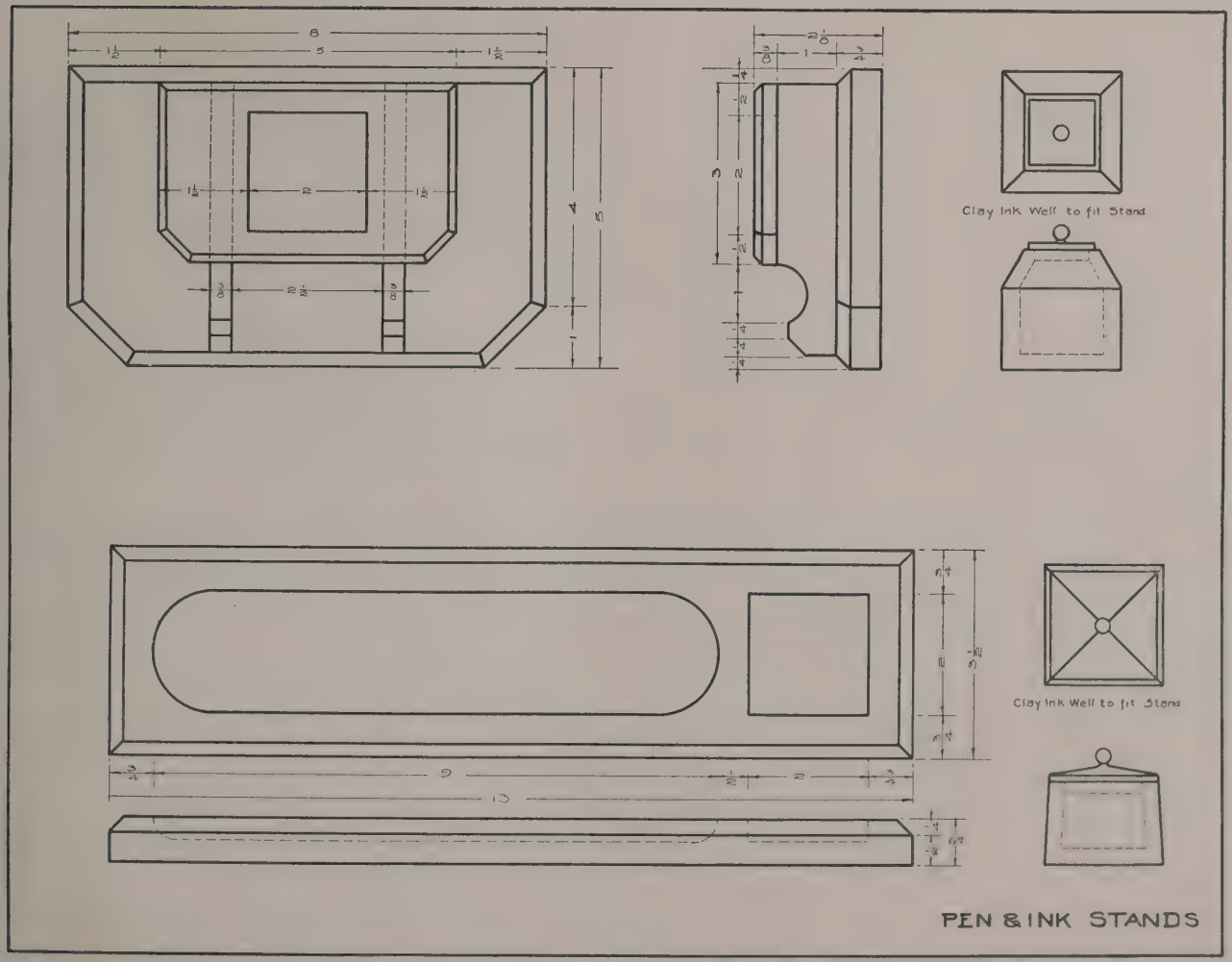


Fig. 5—Working Drawing for Pen and Ink Stands (Sixth Grade)

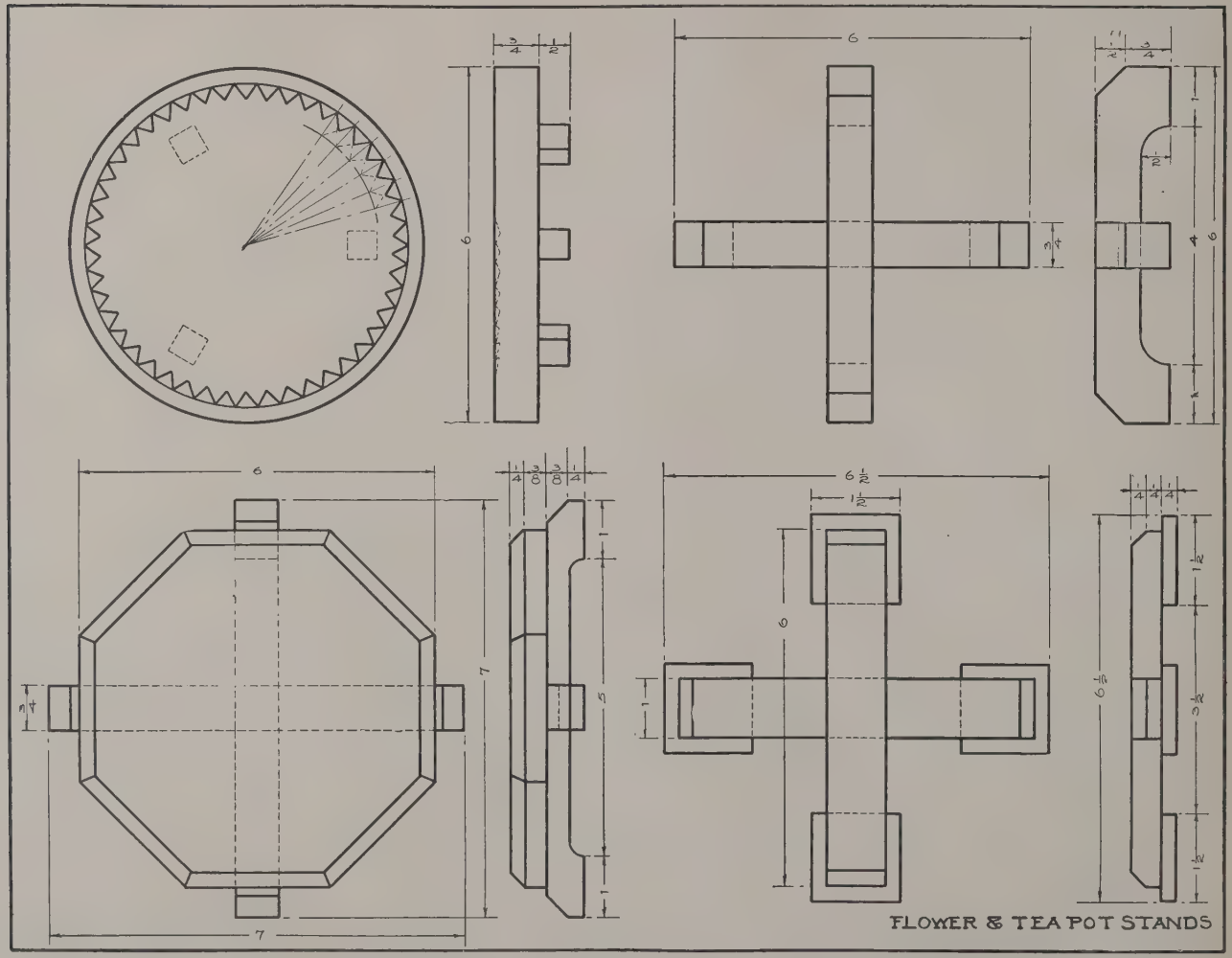


Fig. 6—Working Drawing of Flower and Tea Pot Stands (Sixth Grade)

Chip Carving

Chip carving, sometimes called "peasant-carving," is the development of the savage's delight in notching with a knife the wooden implements and objects of his daily use. As a home industry it has been most fully developed in Scandinavian countries by the peasants, during the long evenings of winter. As a means for the decoration of objects made by the manual training classes, chip carving has been found very attractive to the pupils and has stimulated them to greater effort in the accurate making of the objects to be decorated, for no piece of work may be ornamented unless it is the product of the pupil's best effort.

There can be no dispute as to the practical value of chip carving in training the hand and eye to deftly use a simple tool, and in showing the artistic effects which may be obtained in the employment of geometrical drawing. The plates on chip-carving suggest appropriate borders for boxes, and tea-pot stands.

Great care should be exercised in designing for chip carving, for ninety per cent of the work done should never be permitted. Avoid using the ordinary star shapes so often seen on boxes, match safes, and tea-pot stands. A simple border, carefully executed, is more attractive than the more elaborate forms. Designs for chip carving should always be carefully drawn with a sharp pencil, the pupils planning their own designs.

This involves an incidental teaching of the most elementary geometry.

Chip carving should be especially interesting to teachers of manual training. The fact that it is essentially a home craft makes it possible to provide profitable and attractive work to be pursued during the boy's leisure hours.

Few tools are necessary. The tool known as the chip-carving knife is all that is needed by beginners.

The work is not fatiguing and may be done on any kind of table, and makes little or no mess or litter.

The numerous objects of home life which may be decorated at a small cost greatly enhance the pleasure of the work.

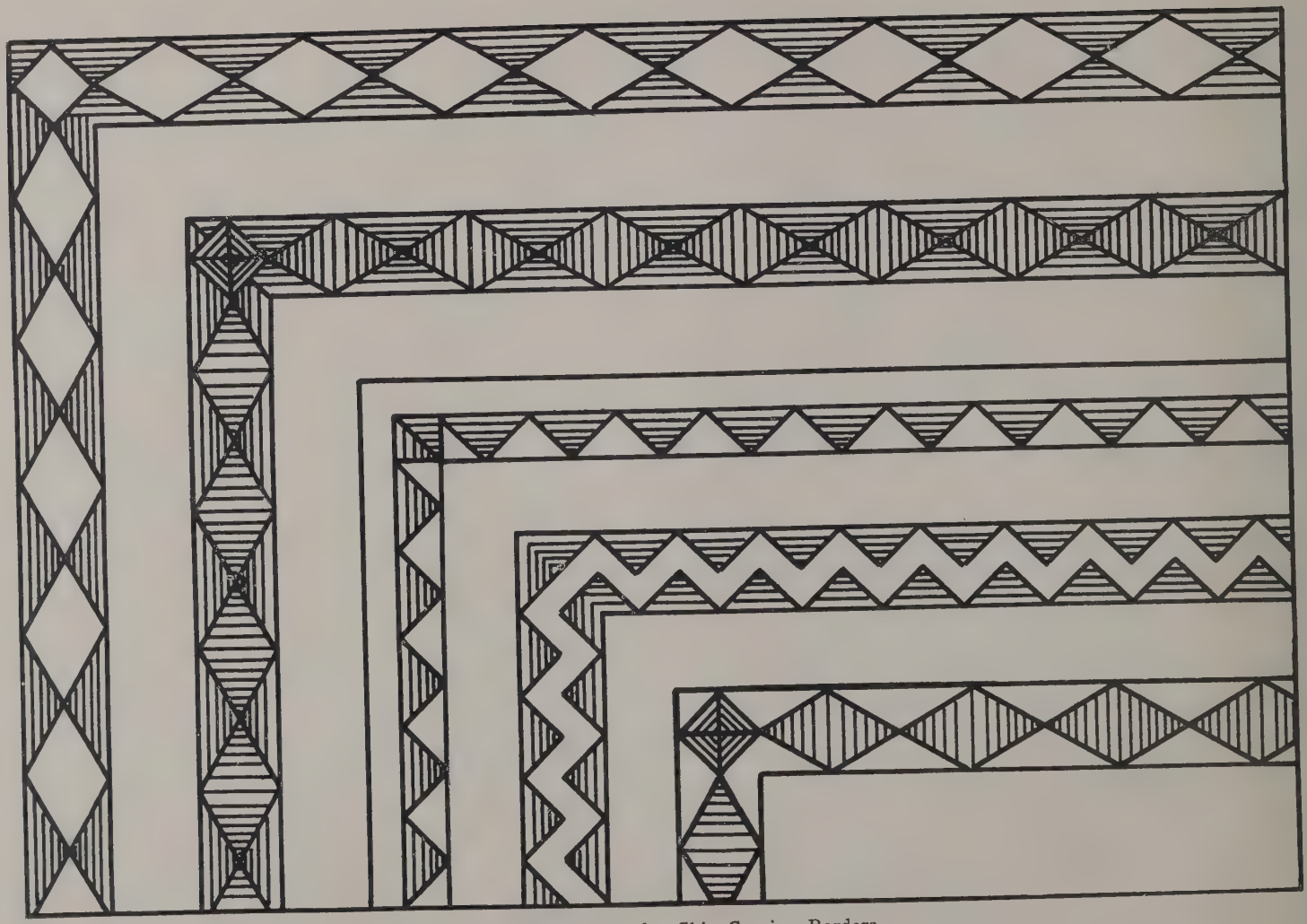


Fig. 7—Suggestions for Chip Carving Borders.

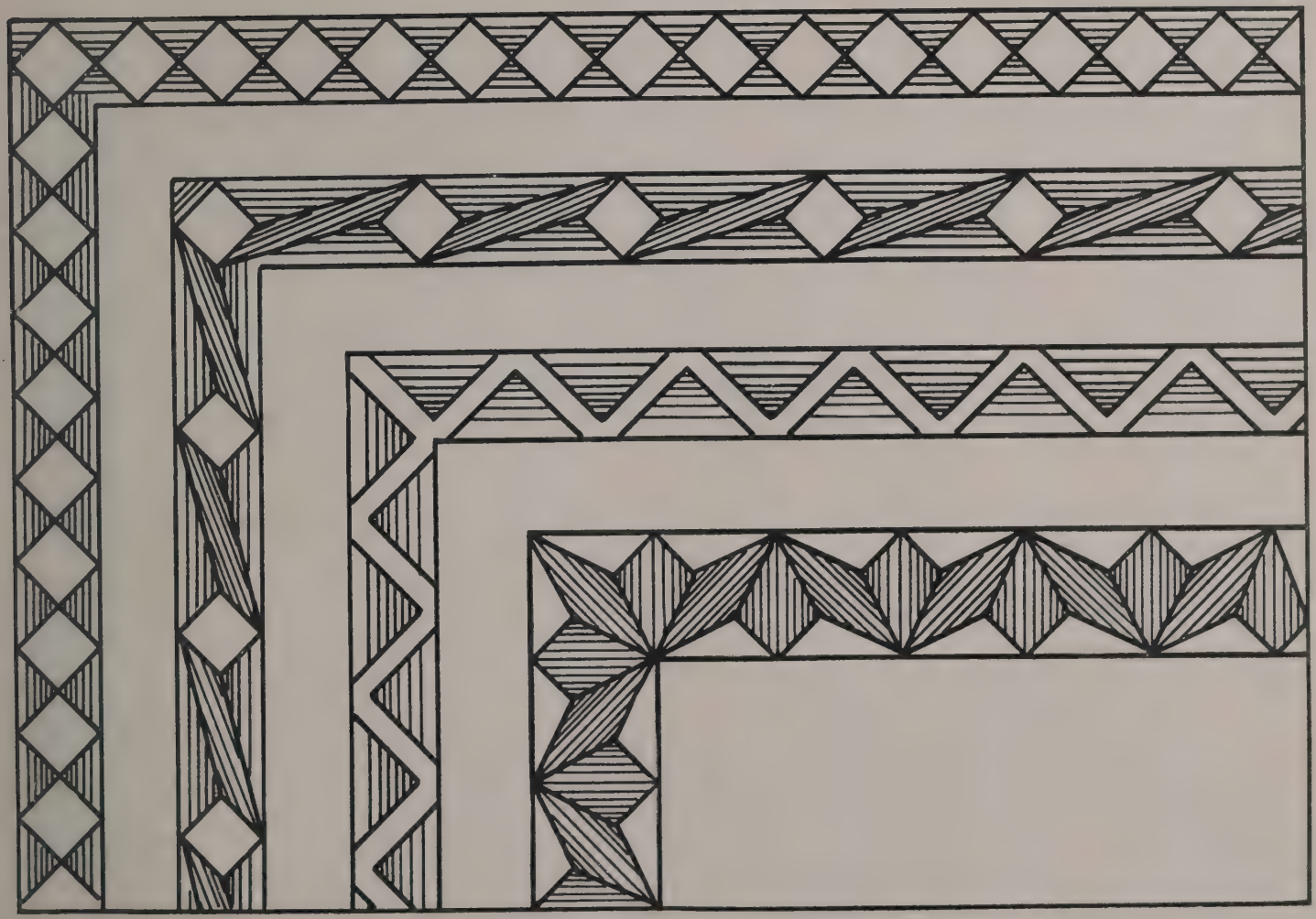


Fig. 8—Suggestions for Chip Carving Borders

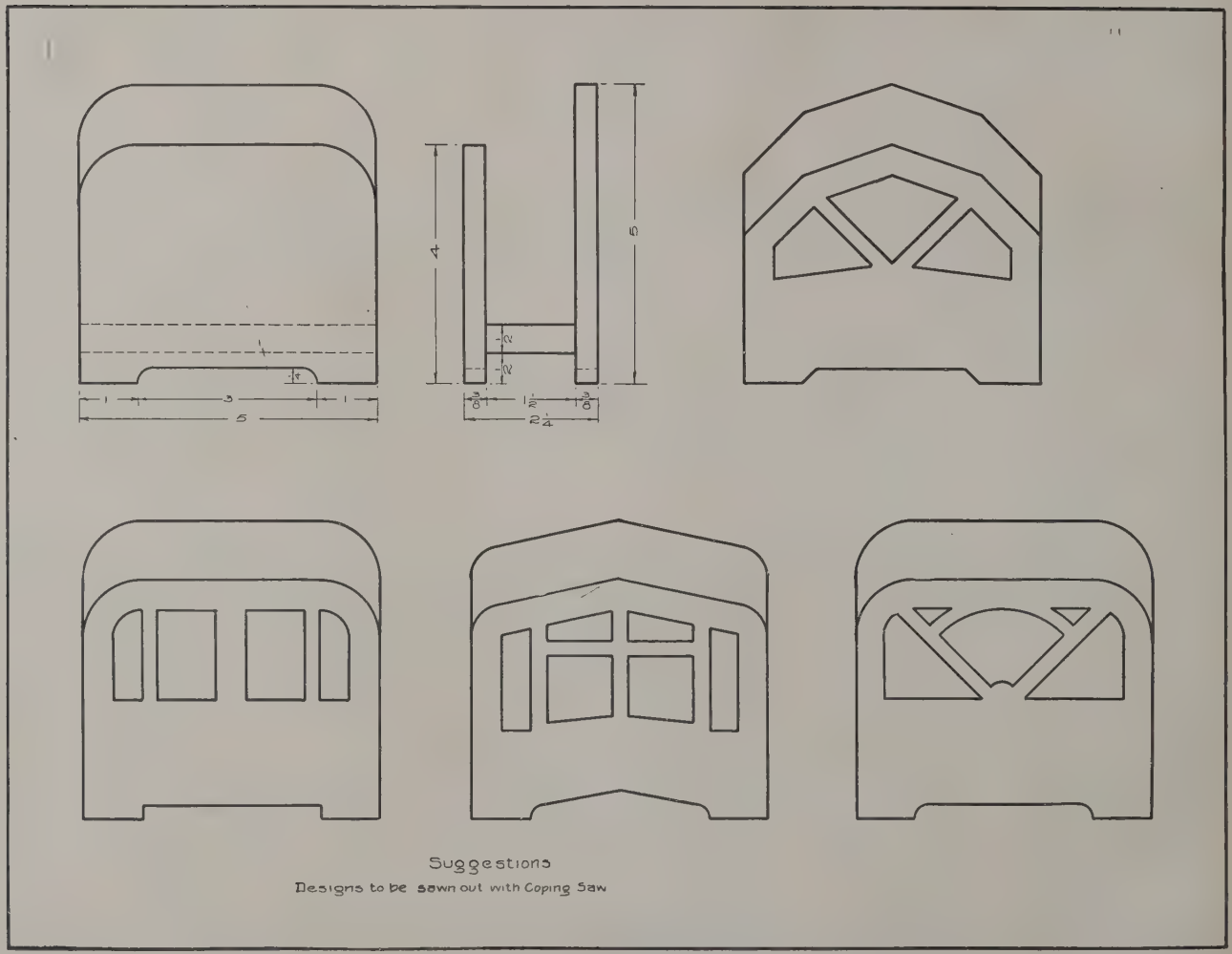


Fig. 9—Working Drawing and Suggestions for Designs of Ends of Stationery Holders (Sixth Grade)

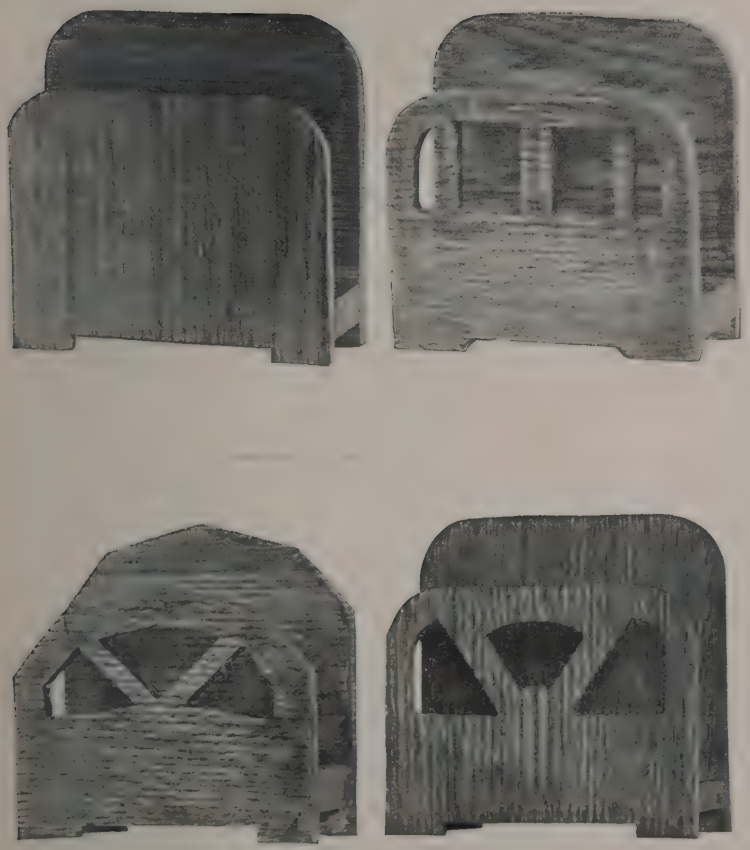


Fig. 10—Stationery Holders

Stationery Holders

The stationery holders shown in Fig. 10 are most attractive and simple in construction. Any one of these exercises, as well as the ink stand shown in Fig. 5, gives good practice in construction involving the use of the butt joint. In Fig. 10 the front and back pieces are nailed and glued to the bottom cross piece, the heads of the nails being sunk and the holes filled with filler. The exercise offers most excellent opportunity for applied design. In this case the spaces which may be stenciled are cut away. If stenciling is used the design should be outlined with a sloyd knife. This not only outlines the design but also prevents the color from spreading. Two different colors of stain may be used, or one stain may be used either on the design or the background, leaving the part not stained, natural. Any paint, cut in benzine or turpentine may be used in stenciling. When cut as above described it becomes a stain instead of a paint which destroys the grain of the wood.

A simple chip carved border may be used in outlining the design. If the holder is constructed and left perfectly plain as shown in the figure in the upper left hand corner, a calendar may be tacked or glued to the surface of the front piece, thus breaking up the space and serving a double purpose.

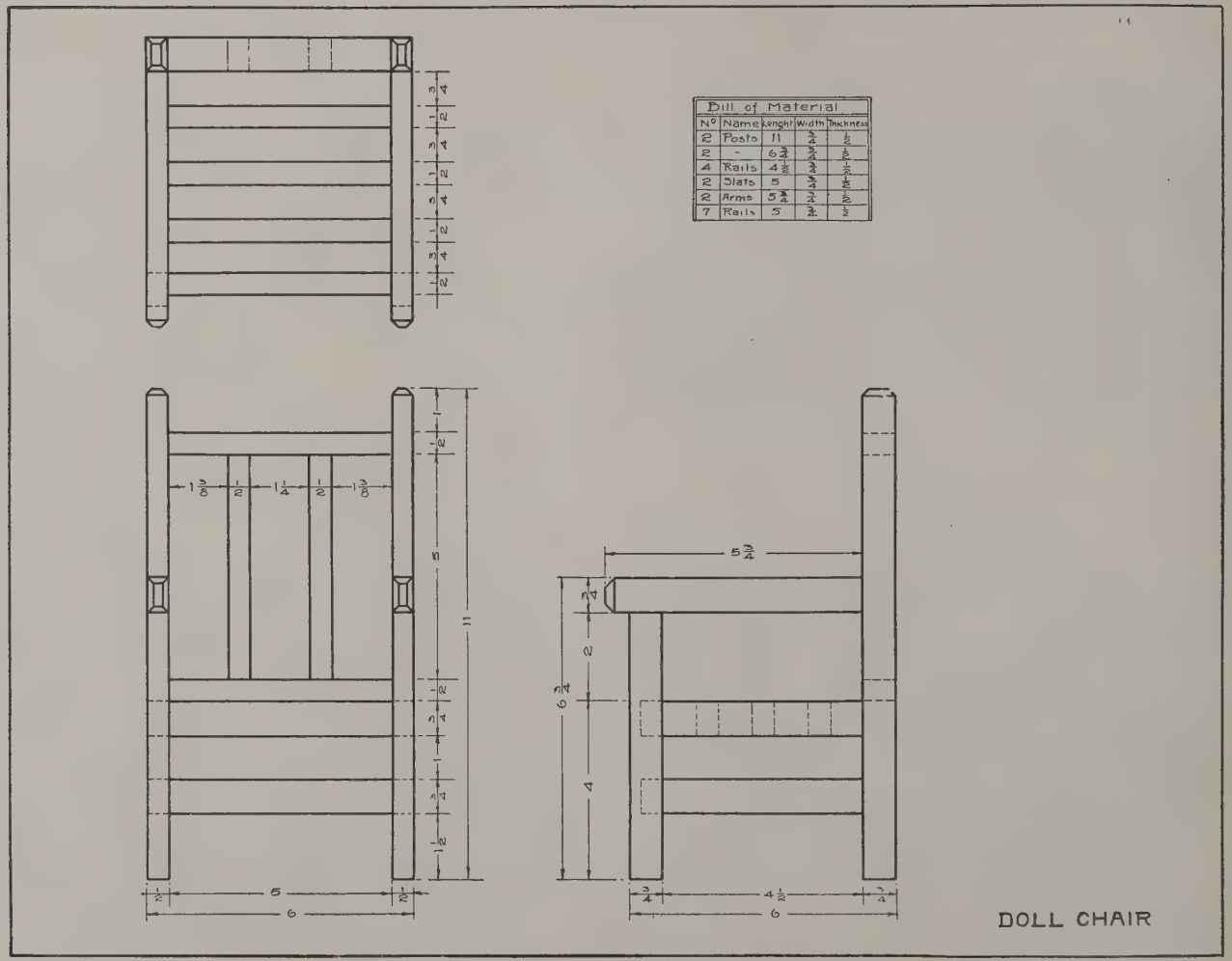


Fig. 11—Working Drawing of Doll Chair (Sixth Grade)

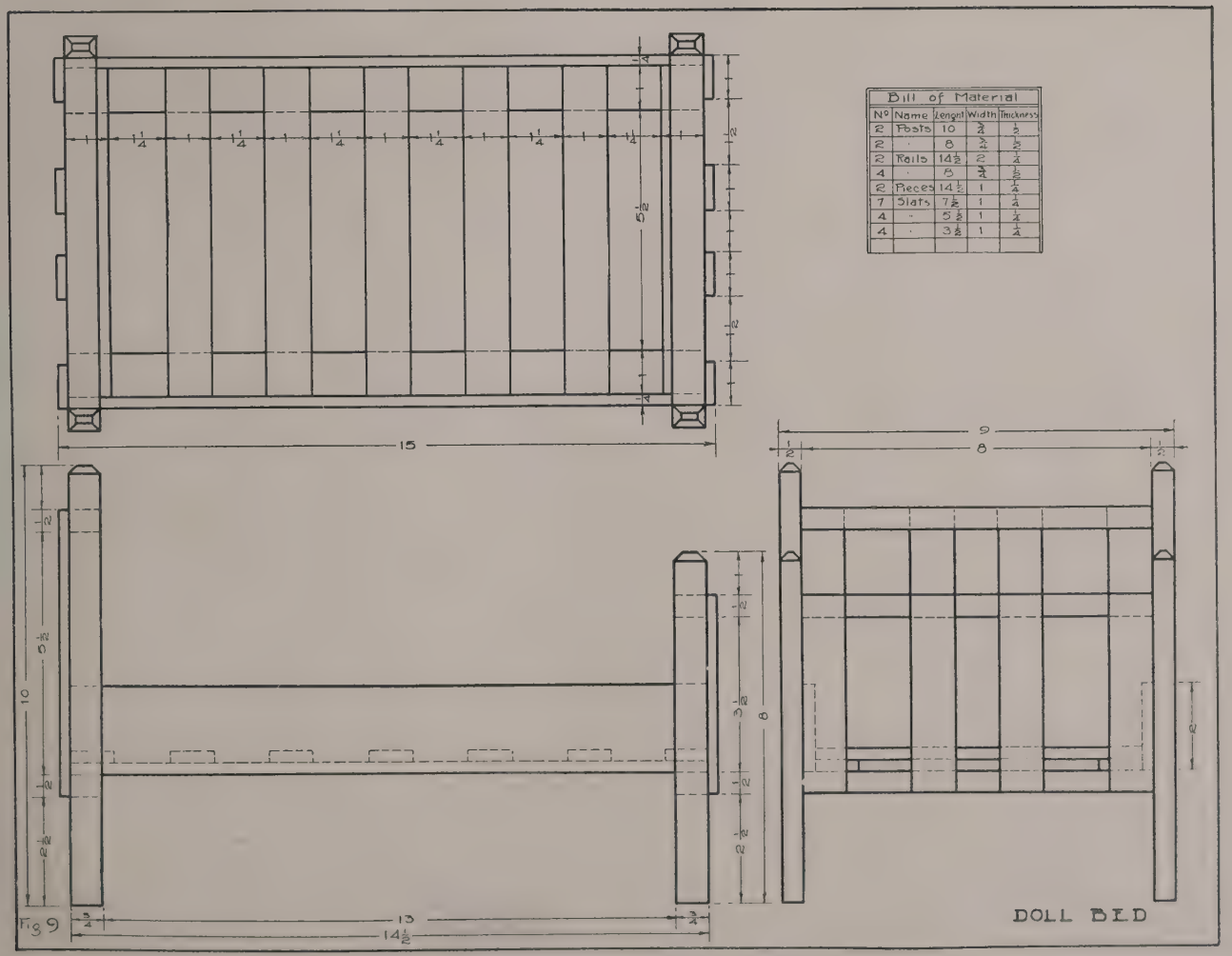


Fig. 12—Working Drawing of Doll Bed (Sixth Grade)

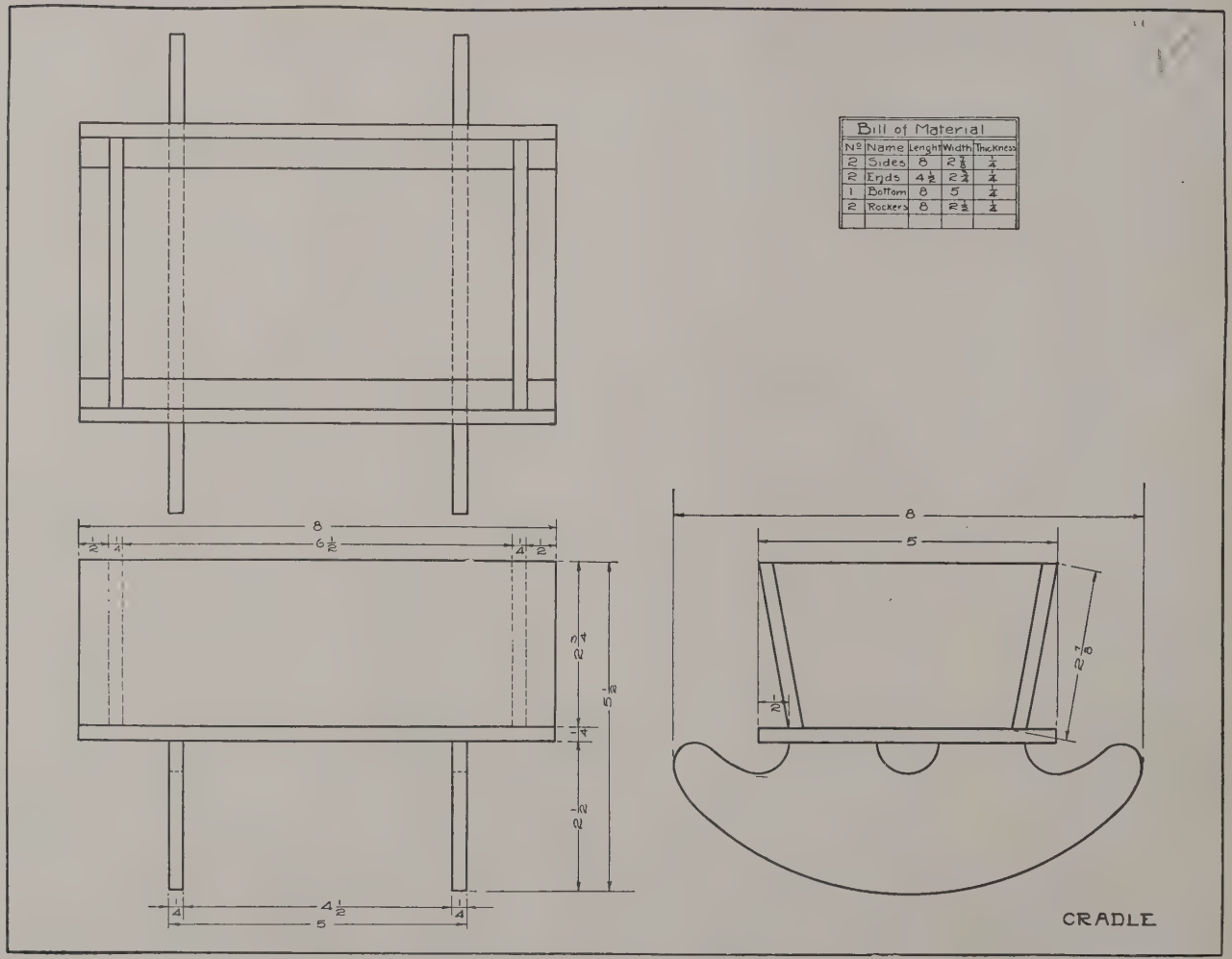


Fig. 13—Working Drawing of Cradle (Sixth Grade)

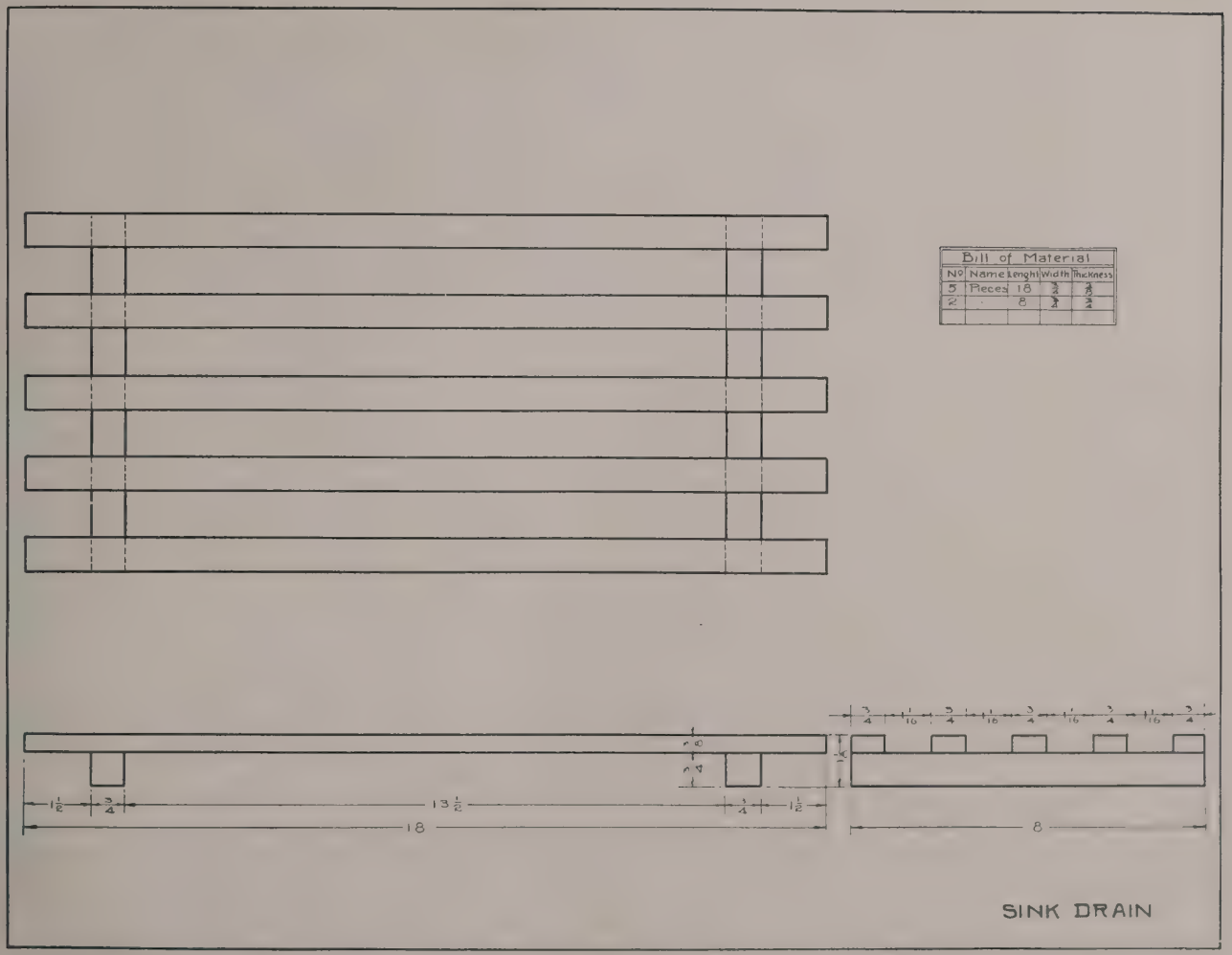


Fig. 14—Working Drawing of Sink Drain (Sixth Grade)

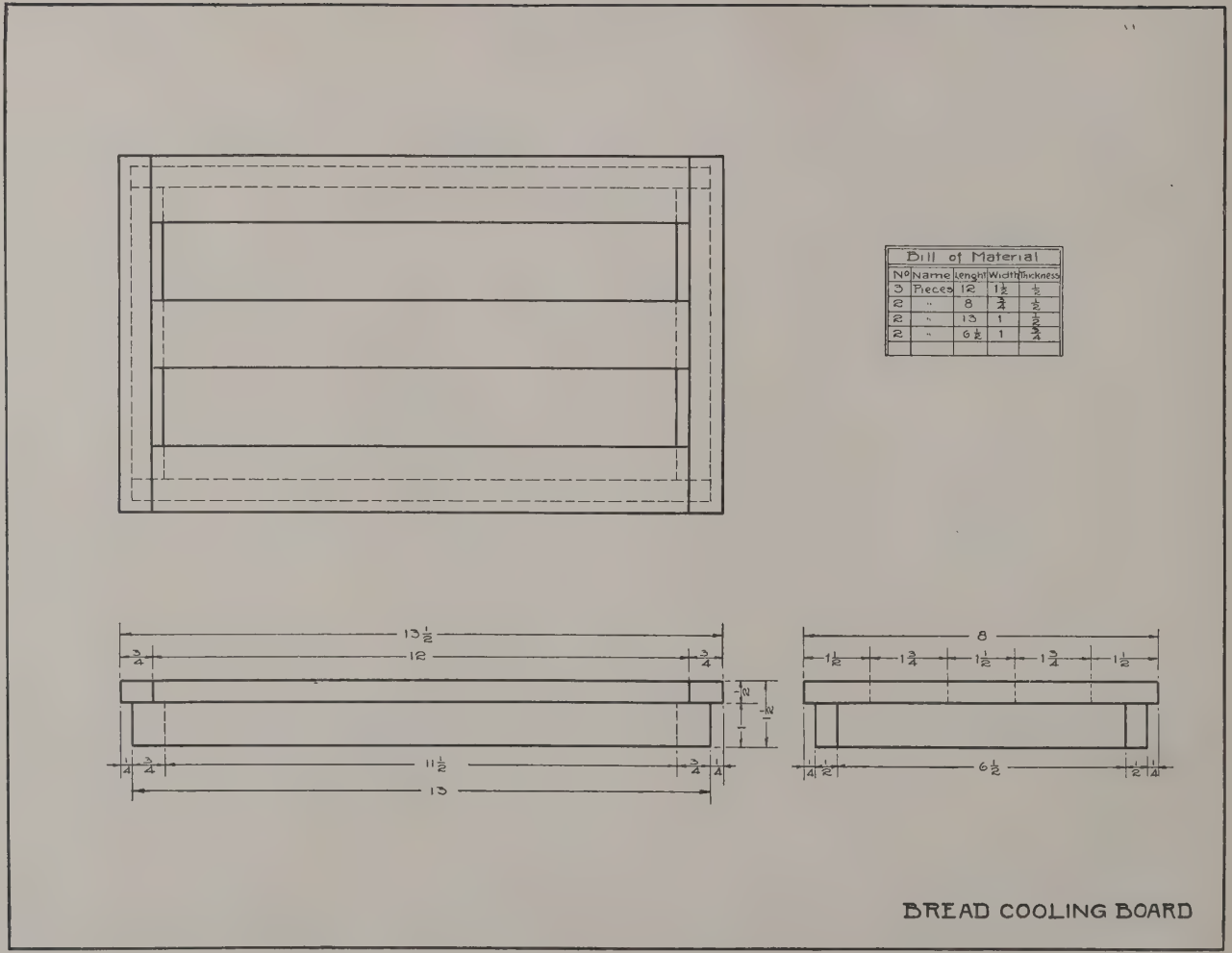


Fig. 15—Working Drawing of Bread Cooling Board (Sixth Grade)

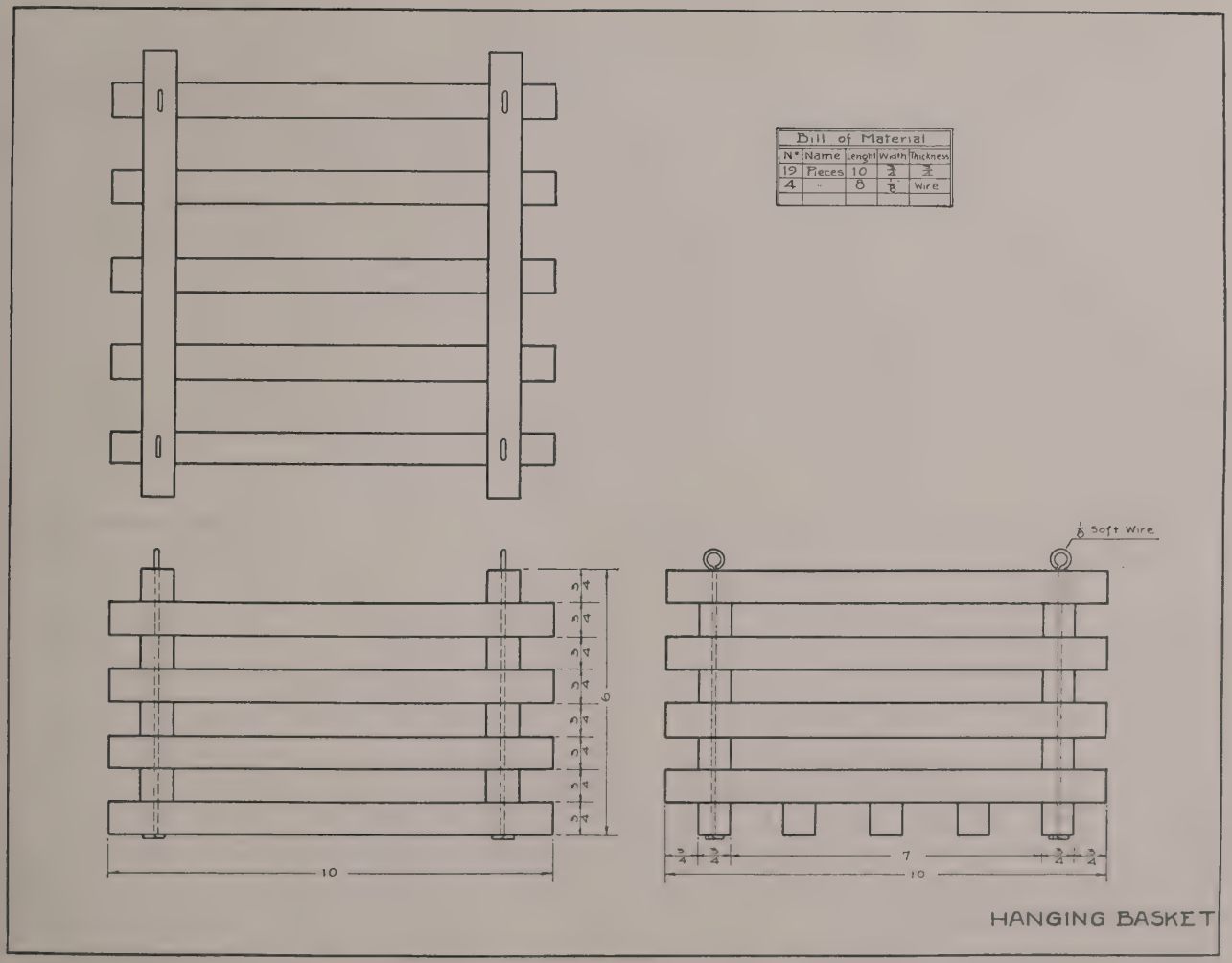


Fig. 16—Working Drawing of Hanging Basket (Sixth Grade)

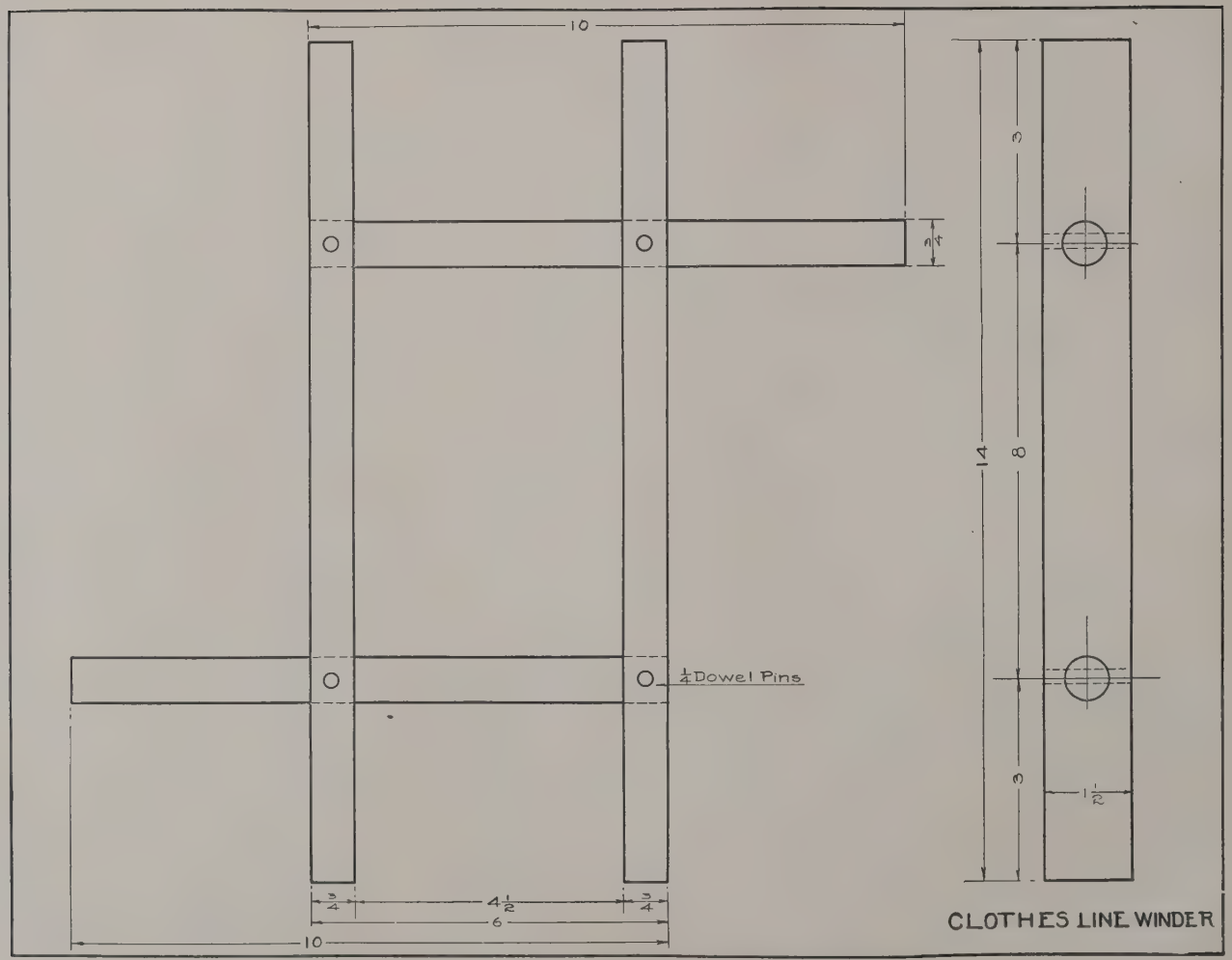
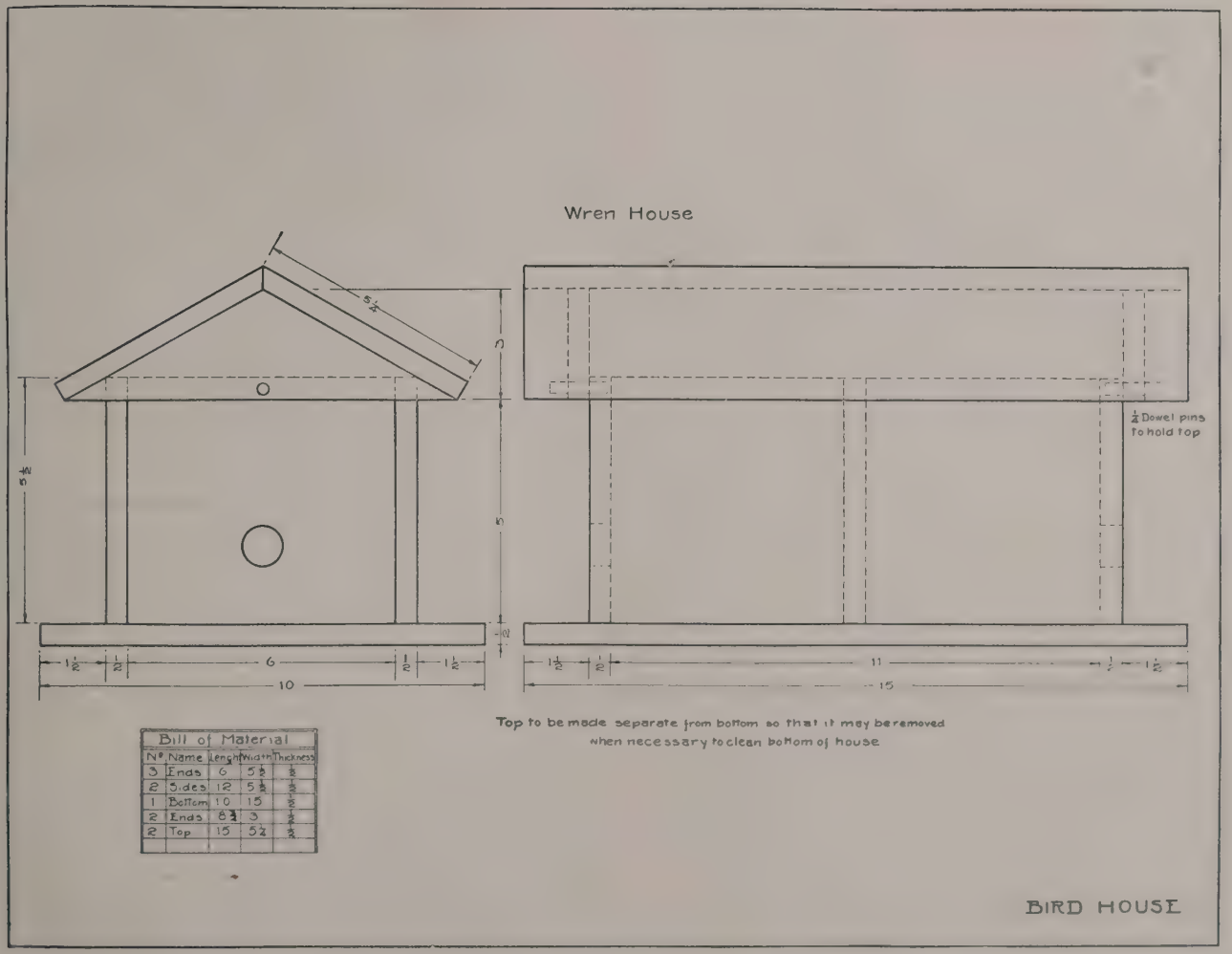


Fig. 17—Working Drawing of Clothes Line Winder (Sixth Grade)



Bill of Material

No.	Name	Length	Width	Thickness
3	Ends	6	5½	⅞
2	Sides	12	5½	⅞
1	Bottom	10	15	⅞
2	Ends	8¾	3	¾
2	Top	15	5½	¾

Fig. 18—Working Drawing of Bird House (Sixth Grade)

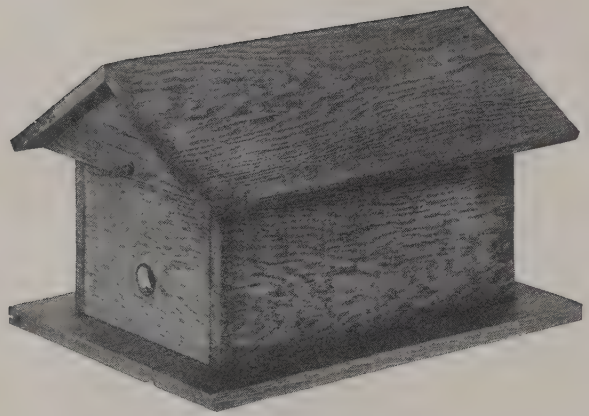


Fig. 19—Wren House

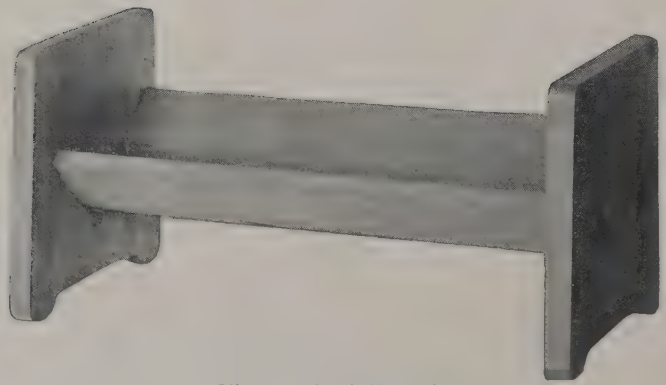


Fig. 20—Book Trough

Bird Houses

The bird life of our nation should be a matter of concern to every one, since the birds are one of our nation's most valuable assets. The loss in the United States to crops, fruits, etc., from insects is estimated to exceed $800,000,000 each year.

Birds are the chief destroyers of insects, and it is the duty, and should be a pleasure, to every man, woman and child to protect these valuable creatures and to encourage them to remain about our homes. The housing and feeding of birds is of national importance. The boys are interested in studying the life and habits of birds and they will do their share toward bird protection. The proper person to help the boys and girls to make houses to attract birds, is the teacher in charge of the shop.

Great care should be exercised in constructing the houses so that they may be conveniently cleaned. The exterior of the house should be kept in the duller colors, as birds are more attracted to this kind of a house. Attention should also be given to the openings through which the birds enter.

If the wren is desired the opening should not exceed a diameter of 1 in., as shown in Figs. 18 and 19. If the opening to a wren house is larger it attracts the English sparrows who are conceded by the United States Government to be destructive to our native song birds.

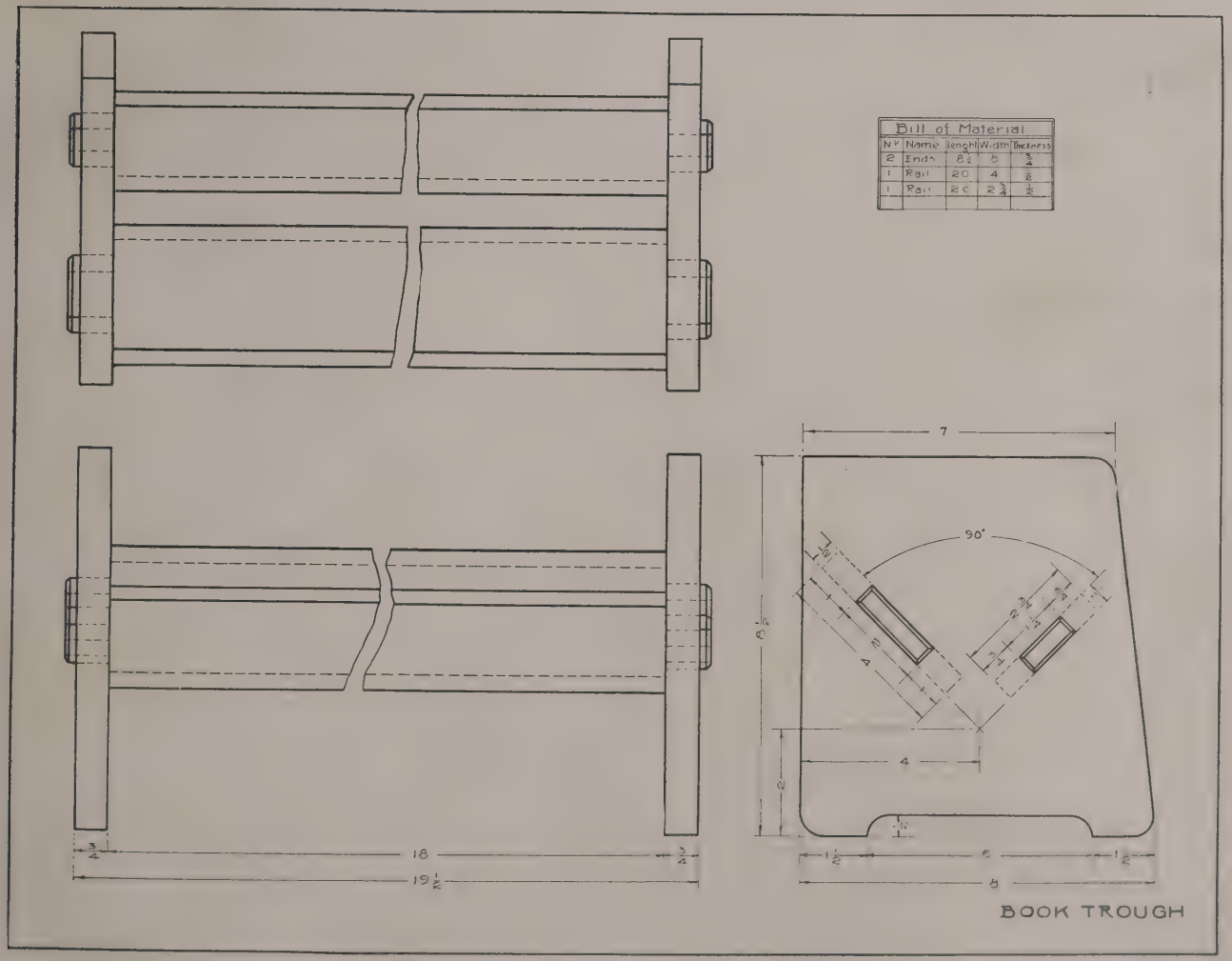


Fig. 21—Working Drawing of Book Trough (Seventh Grade)

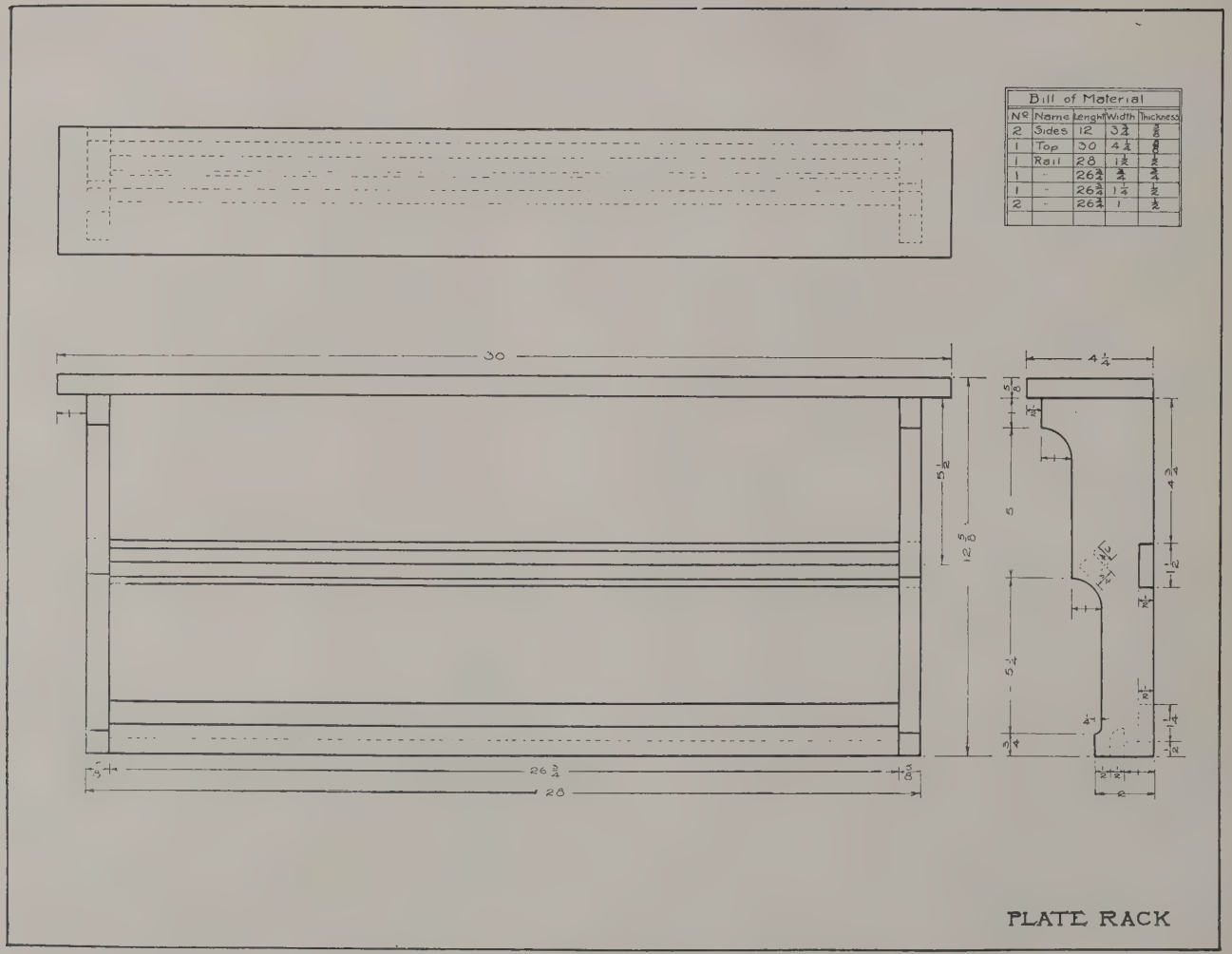


Fig. 22—Working Drawing of Plate Rack (Seventh Grade)

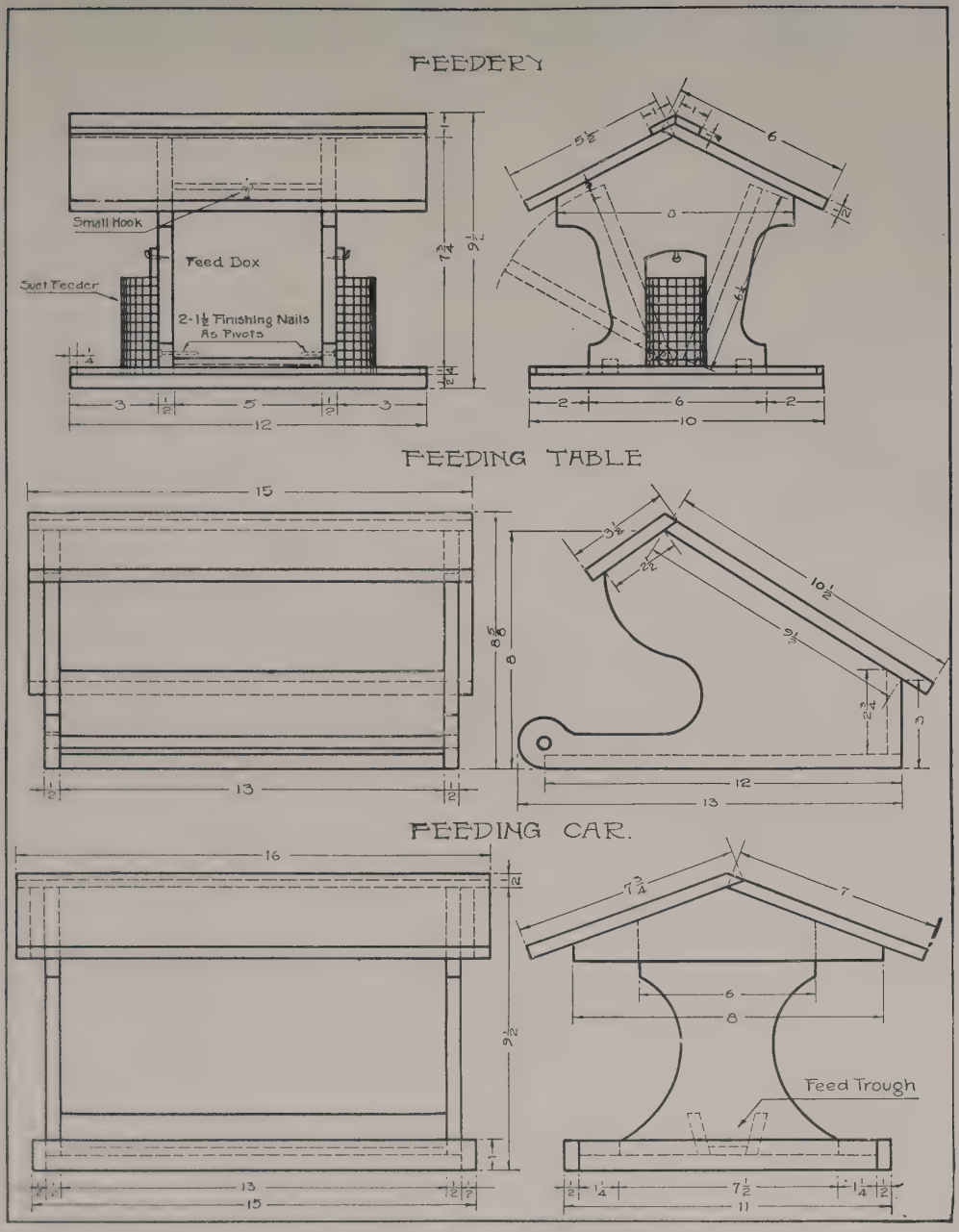


Fig. 23—Working Drawing of Feedery, Feeding Table and Feeding Car (Seventh Grade)

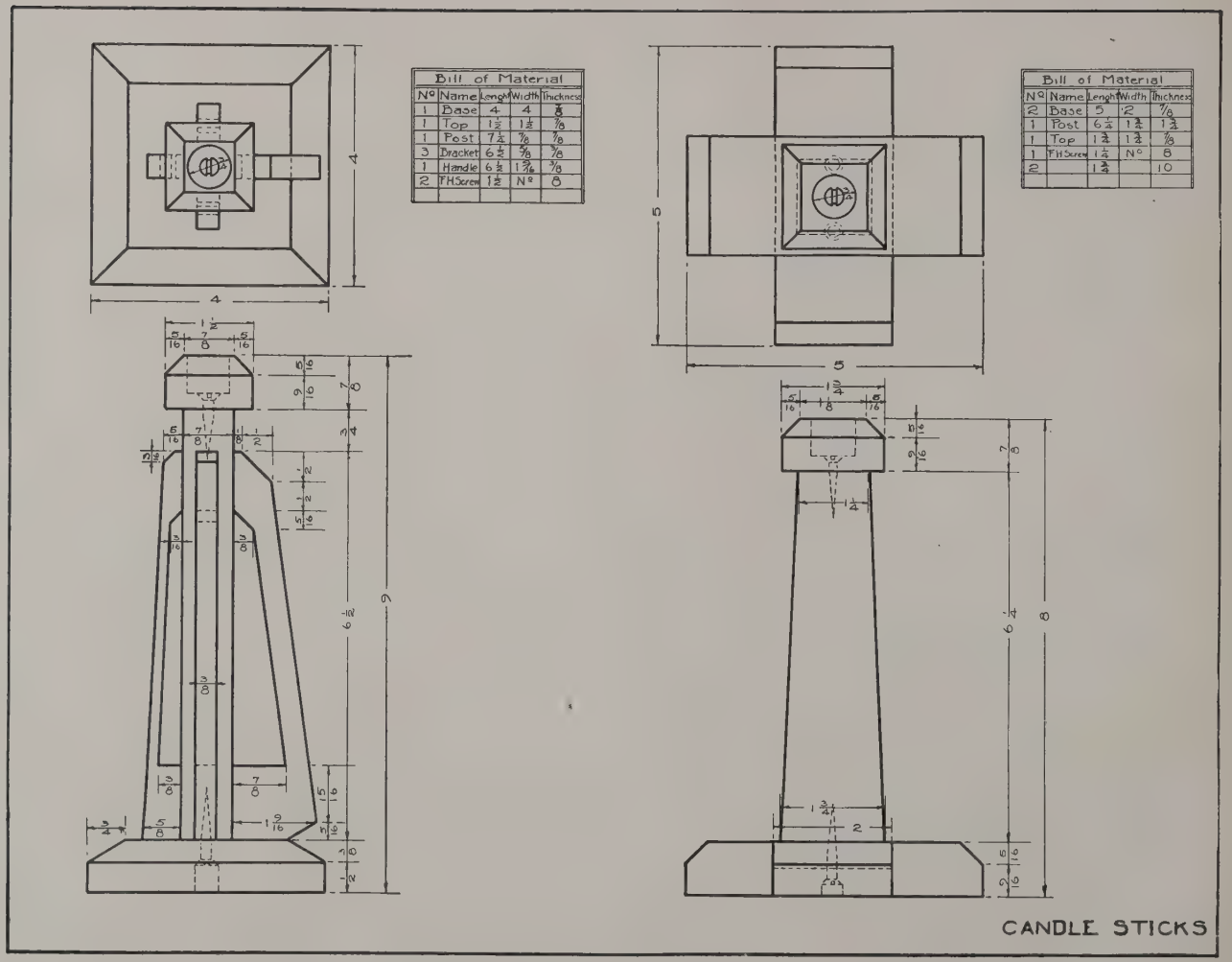


Fig. 24—Working Drawing of Candle Sticks (Seventh Grade)

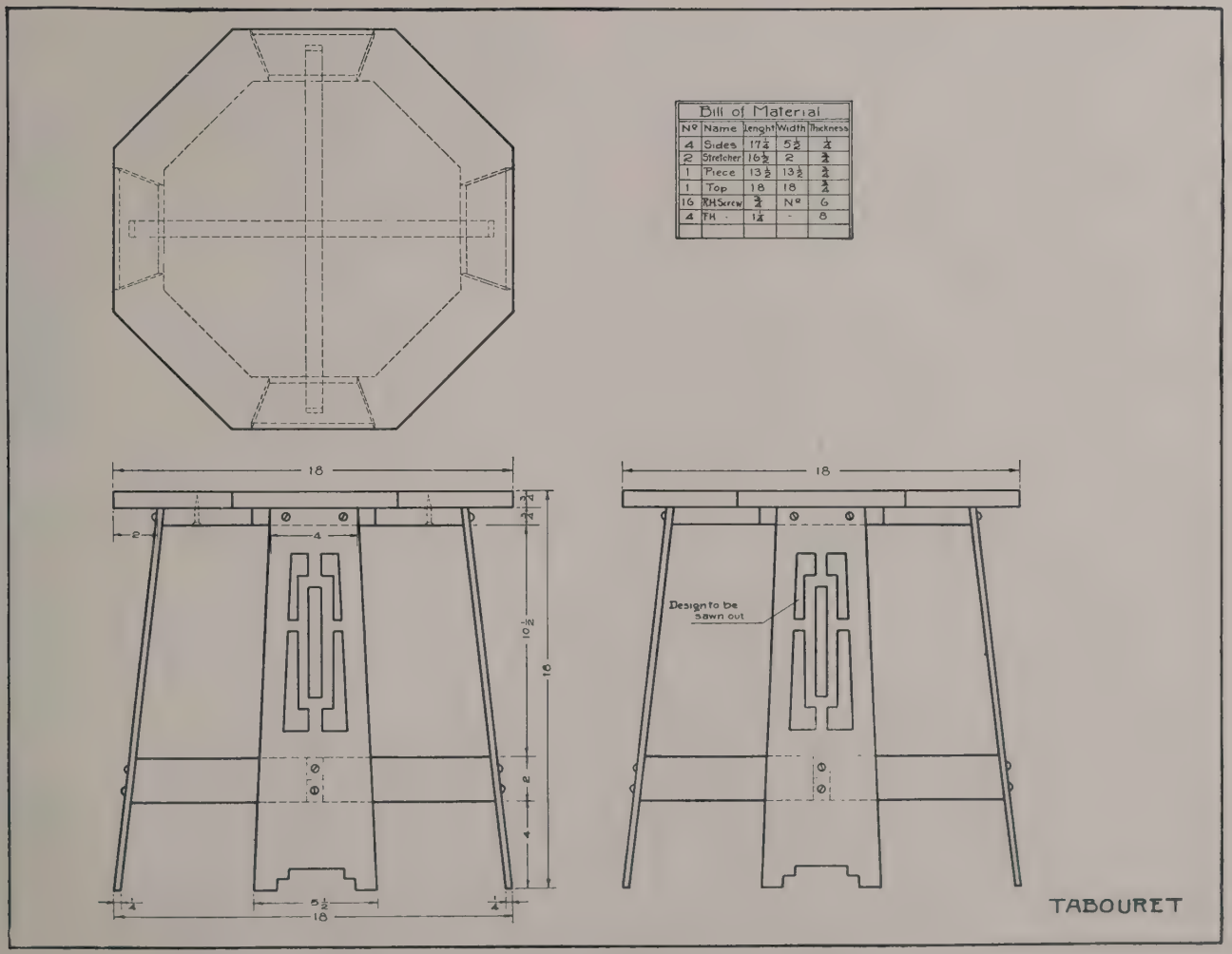


Fig. 25—Working Drawing of Tabouret (Seventh Grade)

Fig. 26—Tabouret

The Tabouret

The tabouret shown in Fig. 26 was made from the working drawing shown in Fig. 25. It is designed to be made in the seventh grade since the construction involves no new joints or operations that are beyond the capabilities of the average seventh-grade boy.

The only new process in the making of this tabouret, that he has not already had, is the gluing up of the two or three pieces of stock that form the top. The gluing up of the top would perhaps be the best operation to do first, for it is the only difficult one in the construction of this tabouret. It might also be a good plan to have the boy dowel the joints of this top piece with two or three $\frac{3}{8}$ in. dowel pins; since it is his first attempt he may not make the joints as well as they might be made, and the dowels will prevent the top from coming apart later.

He may next make the four legs, which will not be very difficult, the stock being $\frac{1}{4}$ in. thick. Then the cross pieces are next required. There is nothing about these that the boy has not already had, for he made half lap joints while in the sixth grade.

The broad or upper cross pieces, which may be made instead of the single piece as shown in the drawing, may now be screwed to the top with $1\frac{1}{4}$ in. number 8 flat head screws, into right position.

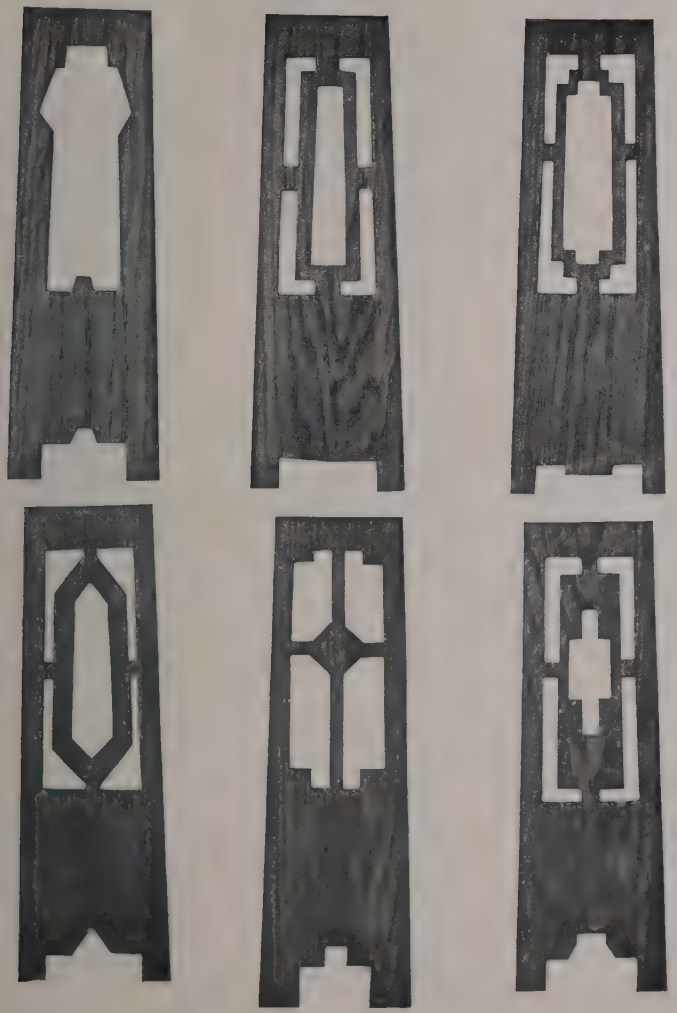


Fig. 27—Designs for Tabouret

The legs are now screwed to the lower cross pieces and then to the upper cross pieces with ¾ in. number 6 round head blued screws. The lower cross piece may be made face up instead of edge up. This would prevent any warping that might occur in the legs, but would weaken the construction.

This is a very attractive as well as a useful piece of furniture when finished, since it may be used as a bed stand, a tea table or a plant stand. The dimensions of the tabouret suit all of these purposes.

Few problems lend themselves more naturally to the applied arts than the tabouret. The pupils study design but fail so often to make application of what they get, to problems of the shop.

Fig. 27 shows a number of most interesting designs for tabourets.

These may be sawed out or they may be stenciled in color, as was suggested for the stationery holders in Fig. 10.

When designing use paper and scissors freely. Through the cutting of paper into various designs, the pupil gets a most excellent idea of the surface covered by his design.

After the cutting, a careful design should be drawn. The drawing is transferred by means of carbon paper.

Every teacher of manual training should aim to introduce as much applied art into his shop problems as possible, taking care that what is used is good art.

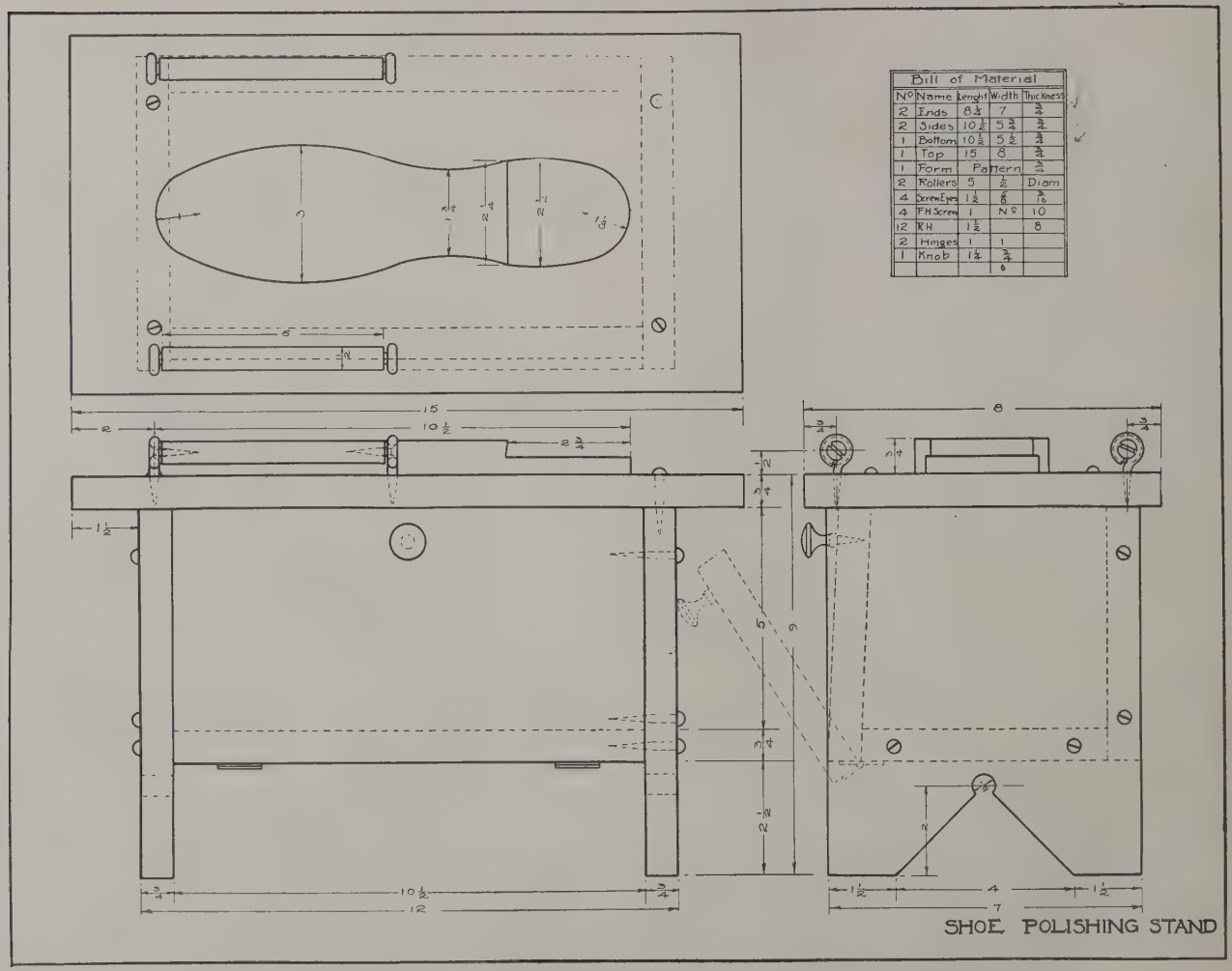


Fig. 28—Working Drawing of Shoe Polishing Stand (Seventh Grade)

The Shoe Polishing Stand

Fig. 28 shows the working drawing of a unique stand and Fig. 29 shows the completed stand. It is very simple in construction and, though not a very beautiful piece of furniture, it is surely the most useful one that a boy can make. The joints are all butt joints glued and screwed together with 1½ in. number 8 round head blued screws. The operations are the squaring up of duplicate parts and a little spoke shave work in forming the foot rest. The only new operation is the hanging of the door, which is not in this case very difficult. It will be noticed that the door is put on a slant so that it will stay closed without the aid of a catch.

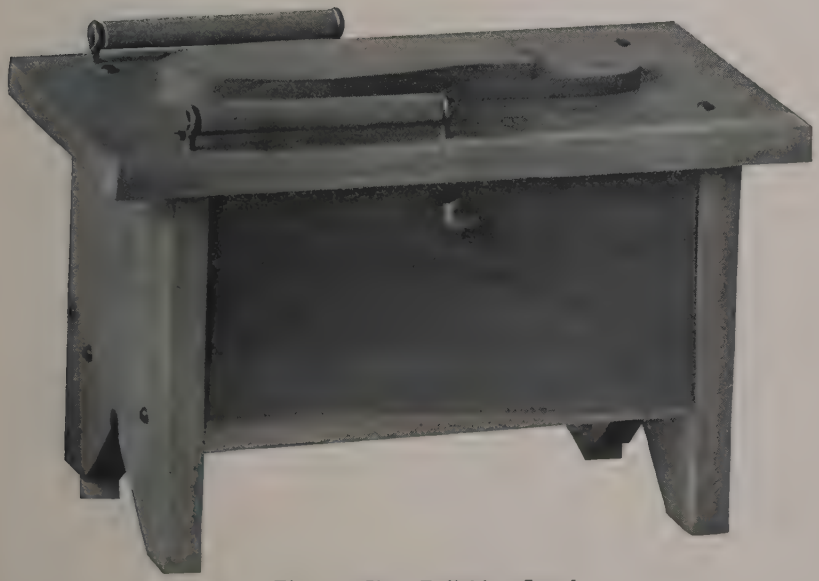


Fig. 29—Shoe Polishing Stand

The feature of this shoe polishing stand over all others is the rollers at the sides of the foot rest. A cloth is passed under the rollers and over the toe of the shoe. Then, when one pulls up one end of the cloth with one hand and then the other end of the cloth with the other hand, the cloth passes back and forth across the shoe. With this arrangement one can stand almost erect while polishing one's shoes, while without the rollers one would have to stoop away down.

Fig. 30 shows the working drawing of two sleds, both well within the range of a seventh-grade boy.

In Fig. 31 is shown a working drawing of a community bird house for martins. It contains fourteen separate rooms and is very simple in design and construction. A group of boys might make one for the school yard.

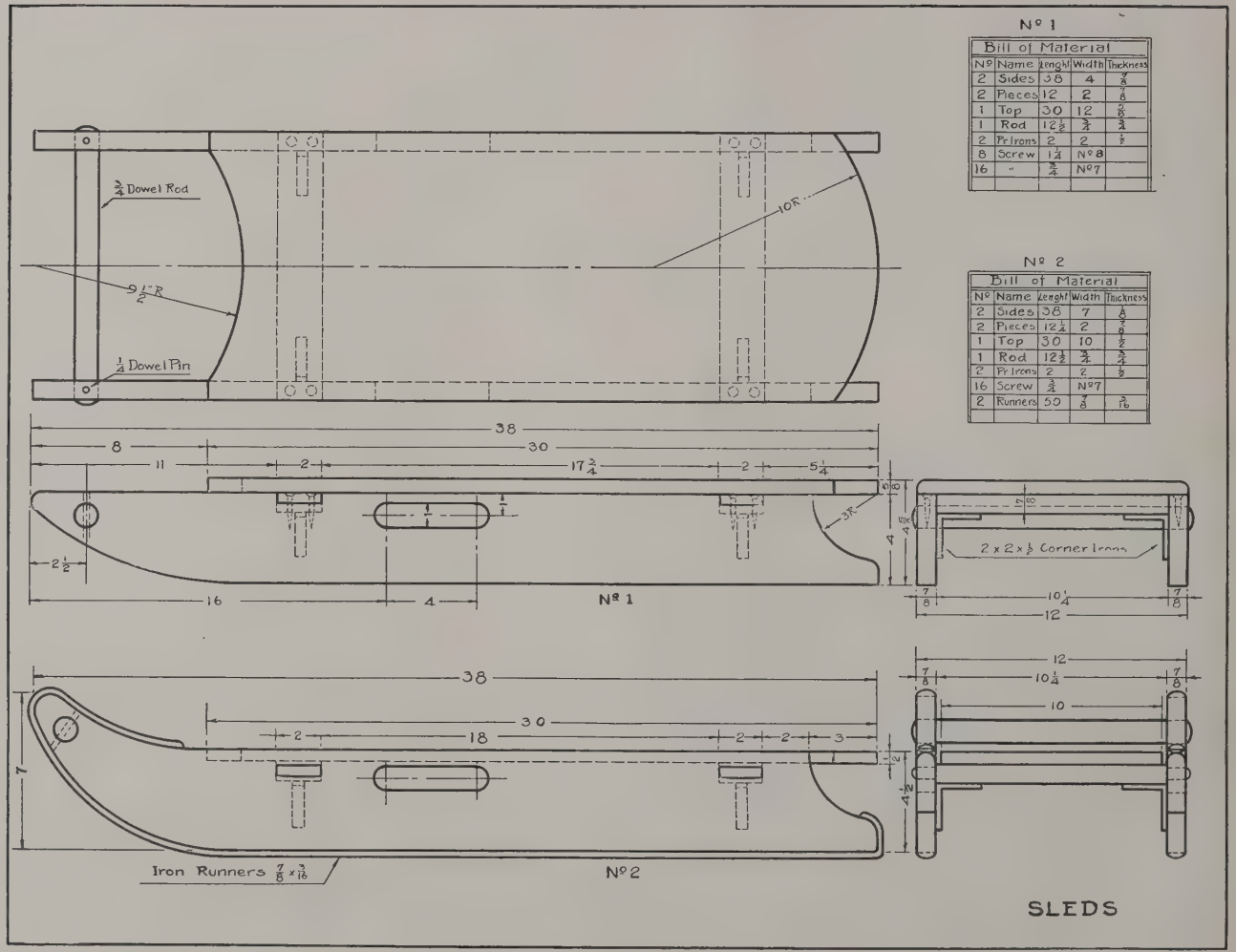
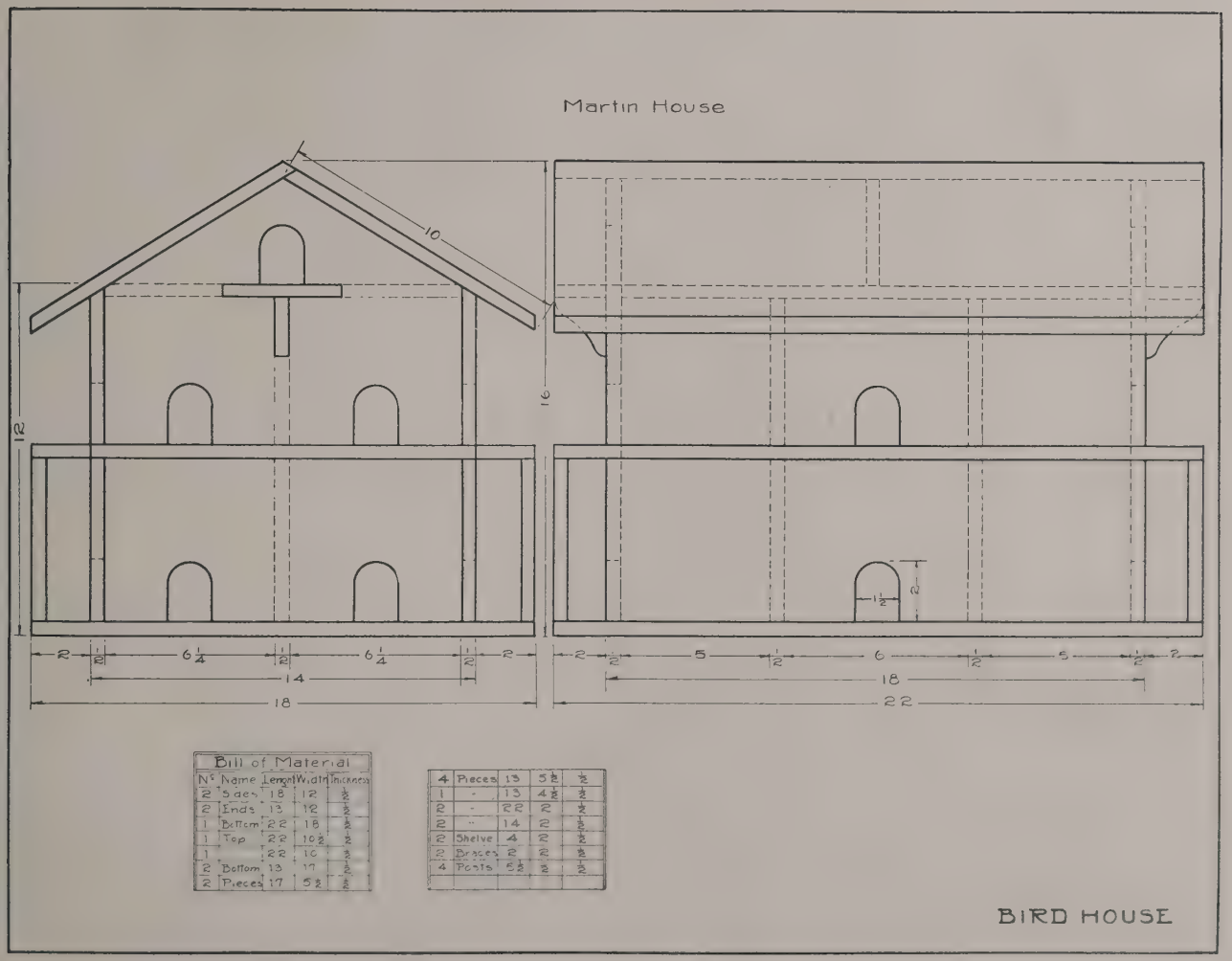


Fig. 30—Working Drawing of Sleds (Seventh Grade)



Bill of Material

No.	Name	Length	Width	Thickness
2	Sides	18	12	½
2	Ends	13	12	½
1	Bottom	22	18	½
1	Top	22	10½	½
1	"	22	10	½
2	Bottom	13	17	½
2	Pieces	17	5½	½

4	Pieces	13	5½	½
1	"	13	4½	½
2	"	22	2	½
2	"	14	2	½
2	Shelve	4	2	½
2	Braces	2	2	½
4	Posts	5½	2	½

Fig. 31—Working Drawing of Bird House (Seventh Grade)

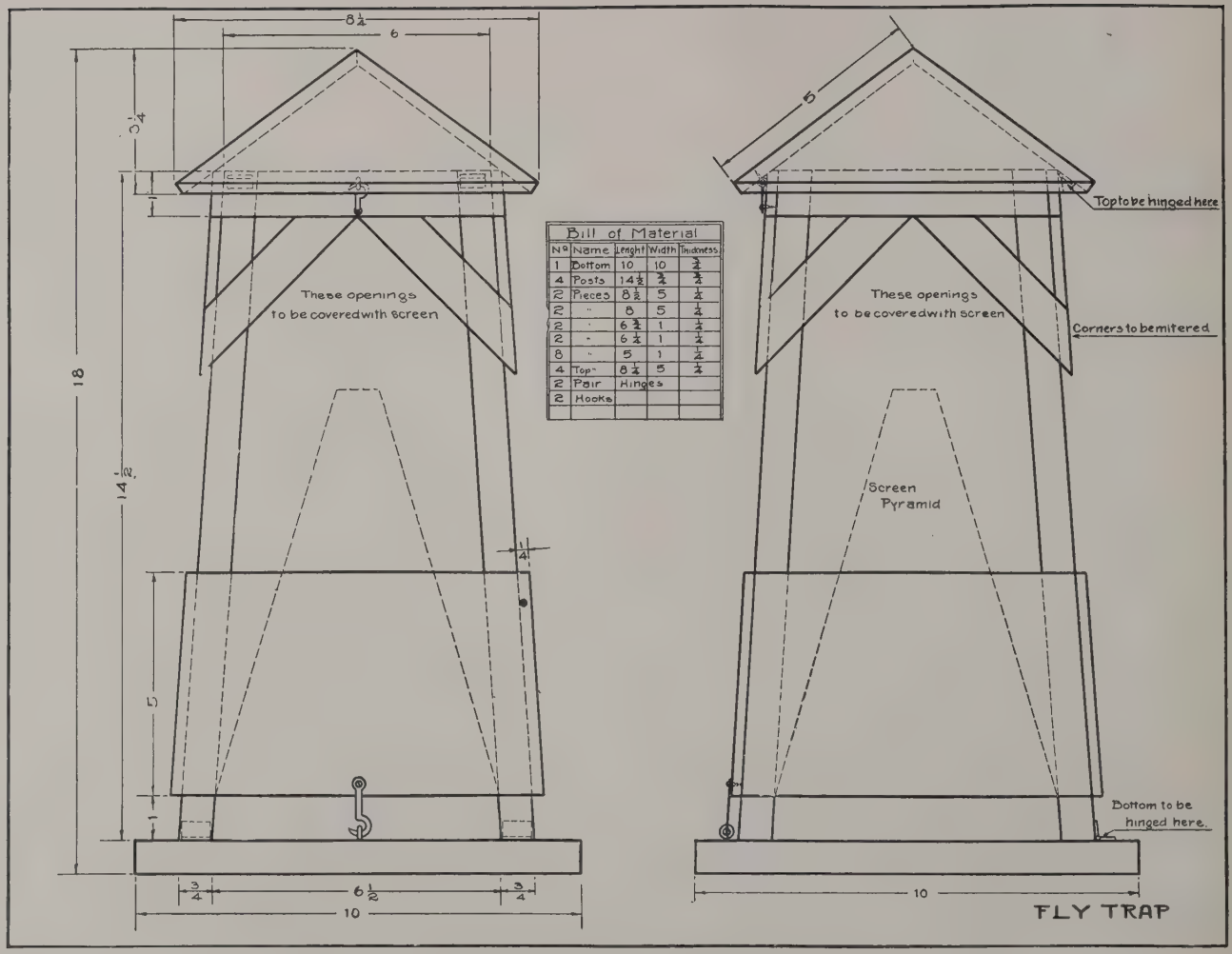
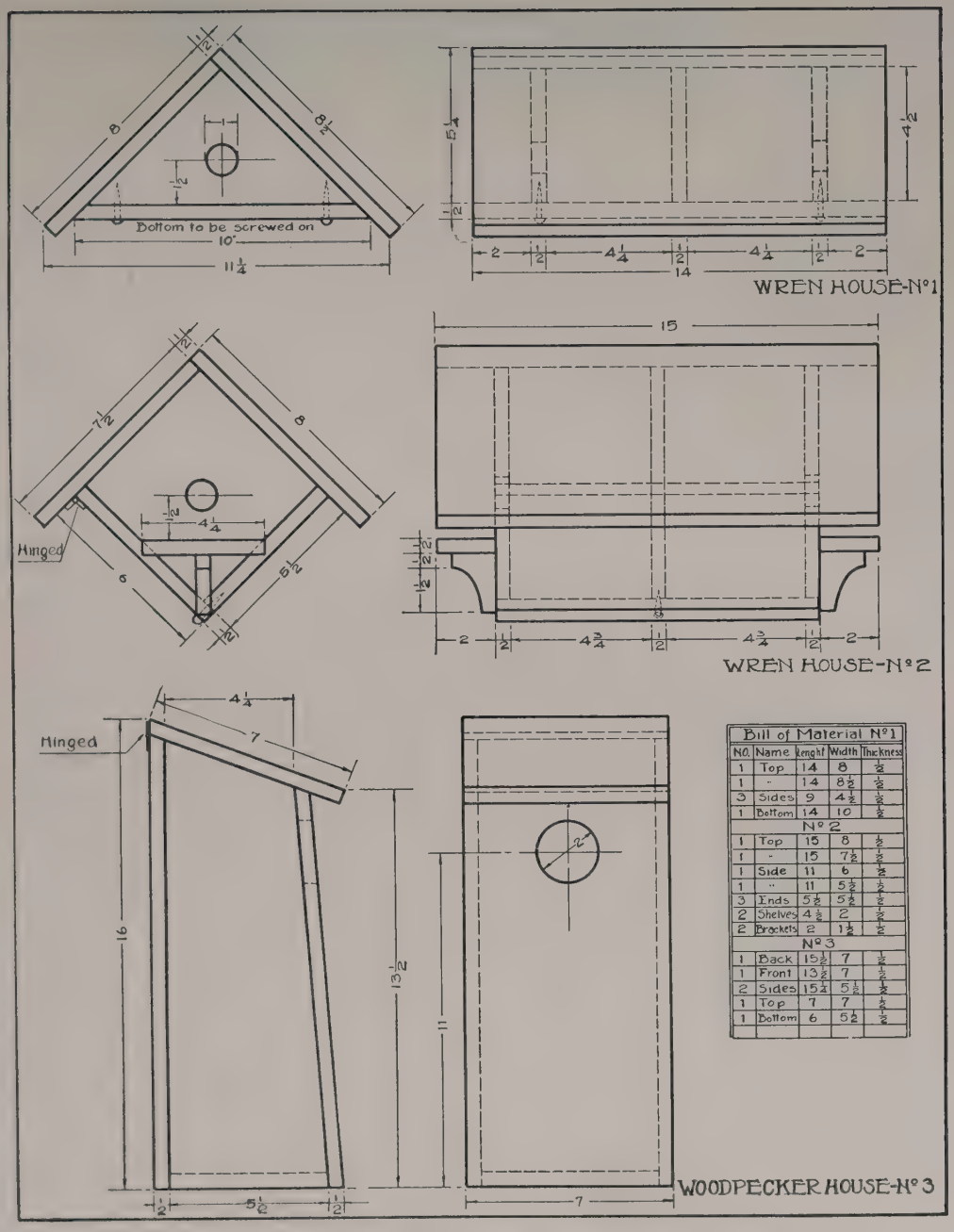


Fig. 32—Working Drawing of Fly Trap (Seventh Grade)



Bill of Material N°1				
NO.	Name	Lenght	Width	Thickness
1	Top	14	8	1/2
1	"	14	8 1/2	1/2
3	Sides	9	4 1/2	1/2
1	Bottom	14	10	1/2
N° 2				
1	Top	15	8	1/2
1	"	15	7 1/2	1/2
1	Side	11	6	1/2
1	"	11	5 1/2	1/2
3	Ends	5 1/2	5 1/2	1/2
2	Shelves	4 1/2	2	1/2
2	Brackets	2	1 1/2	1/2
N° 3				
1	Back	15 1/2	7	1/2
1	Front	13 1/2	7	1/2
2	Sides	15 1/2	5 1/2	1/2
1	Top	7	7	1/2
1	Bottom	6	5 1/2	1/2

Fig. 33—Working Drawing of Bird Houses (Seventh Grade)

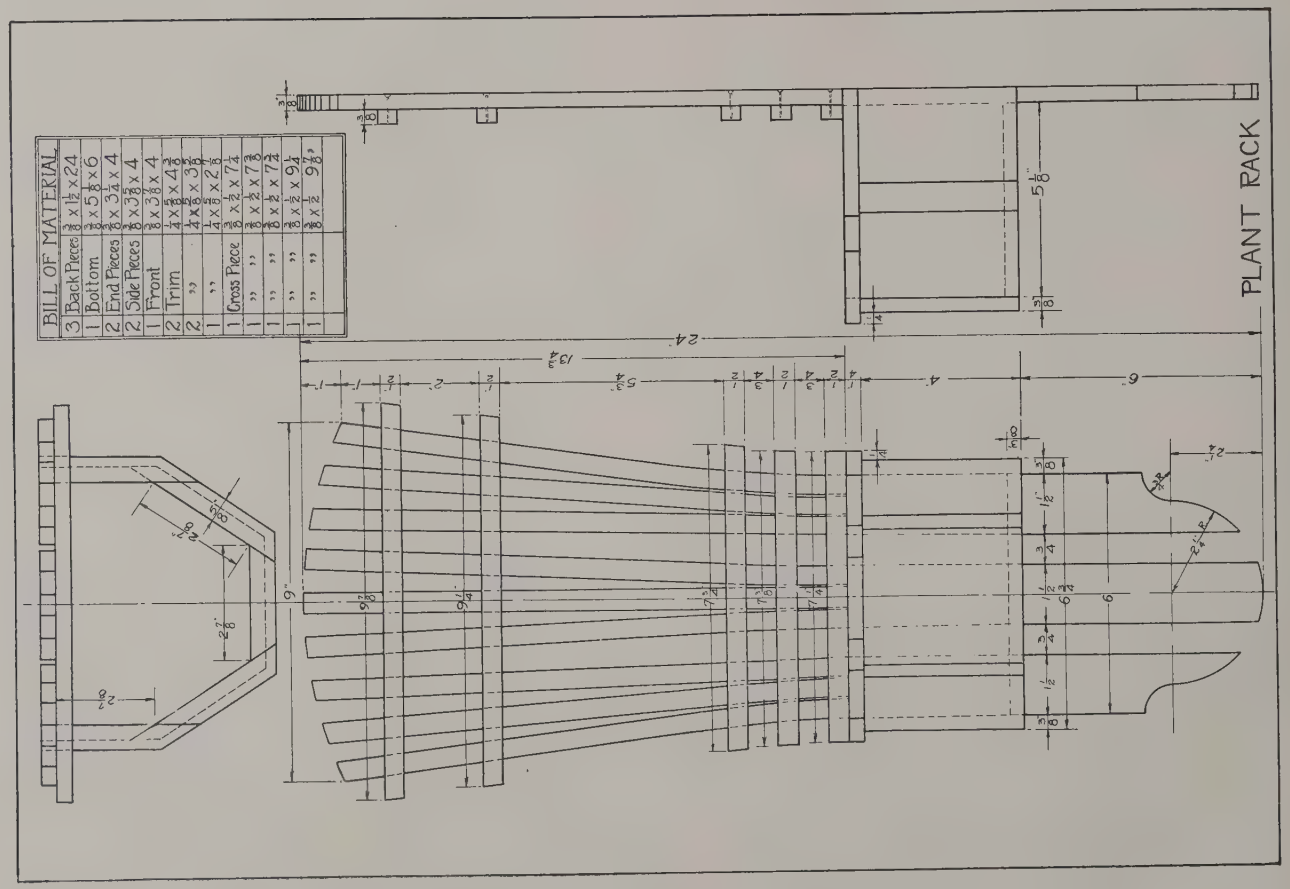


Fig. 34—Working Drawing of Plant Rack (Eighth Grade)

Fig. 35—Plant Rack

Plant Rack

The plant rack, as shown in Fig. 35, makes a most interesting problem for the sun porch. It may be constructed of either poplar or bass wood.

The box part may be made square instead of hexagonal, as shown in the drawing, Fig. 34. The former is more easily constructed.

It will be observed that the ladder part at the back is made of three strips. Each strip above the box is divided into three parts by two saw cuts. The several strips are held apart by small wedges while the cross pieces are tacked in place.

The application of the right kind of design adds to the interest of the problem.

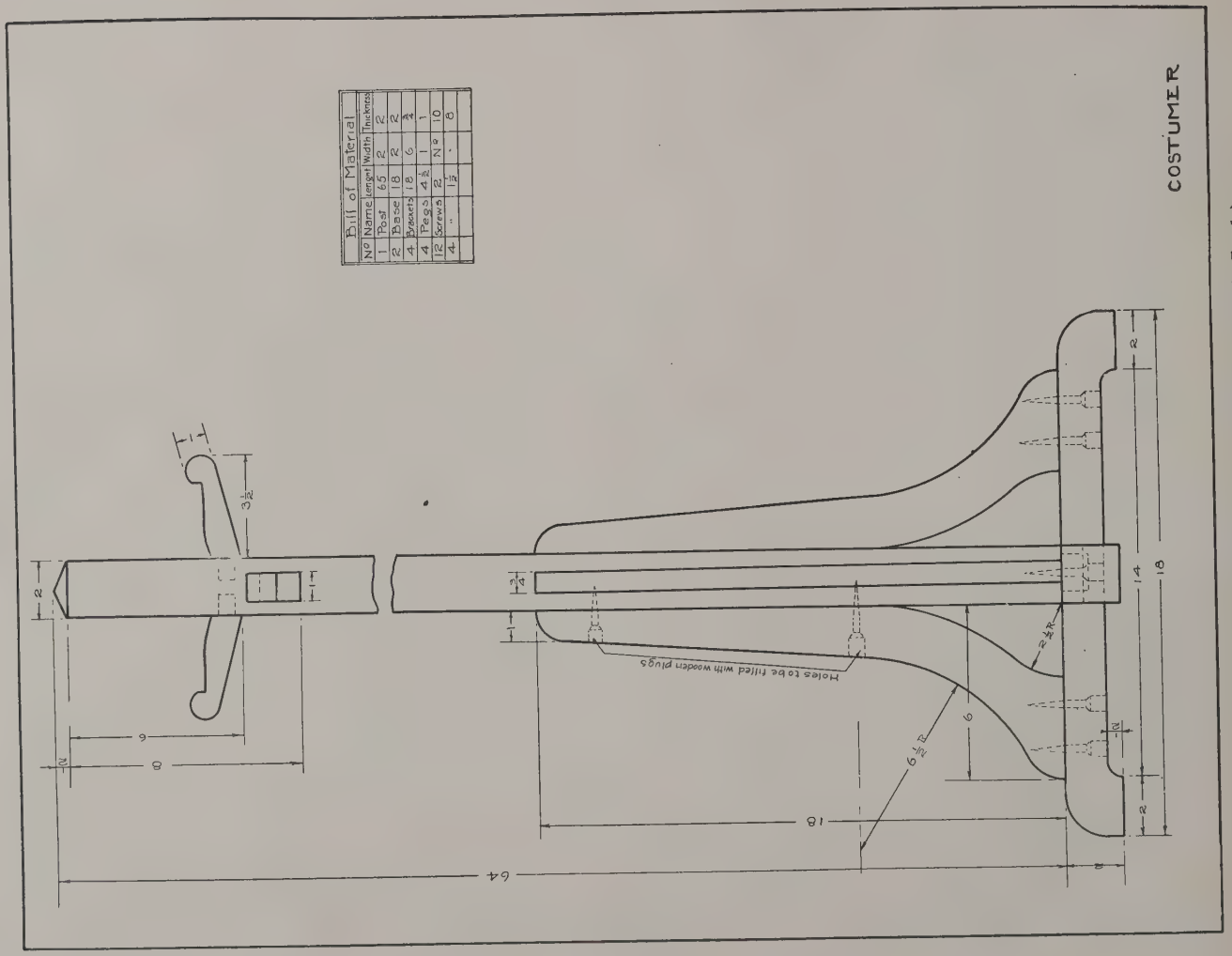


Fig. 36—Working Drawing of Costumer (Eighth Grade)

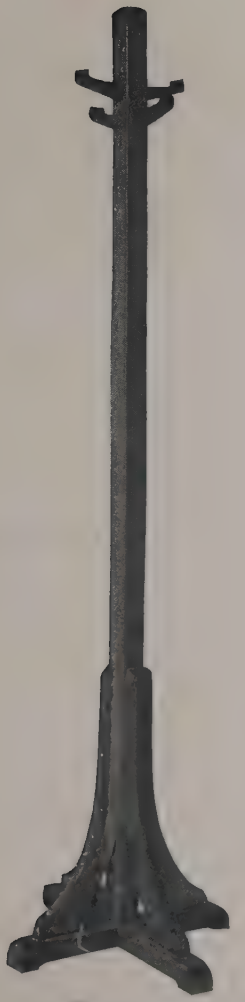


Fig. 37—Costumer

The Costumer

The Costumer shown in Fig. 37 is a very good beginning problem for an eighth-grade boy. It is a large piece of furniture to the boy, and one that he will take great interest in. It is a very useful article when finished, for there is no home in which it cannot find a place, either in the reception hall or bedroom.

It would be best to square up the bottom cross pieces while they are in one piece and then cut them apart to their proper lengths. The bottoms of these cross pieces should be formed before the cross lap joint is made. The tenon should run through the cross pieces and made firm with a wedge.

The braces are next made. A pattern should be made as a preliminary. This can be made of thin wood or heavy paper board. Then the four braces should be marked out on the piece of stock for the same as economically as possible. They should then be sawed out with the turning saw and finished up with the spoke shave and file. There are several methods of fastening the braces to the post and base. They may be nailed with finishing nails, the heads of the nails being sunk and the holes filled with filler. They may be doweled to the post and screwed on to the base, the screws being placed up through the bottom of the base. Or, they may be screwed on as shown in the drawing, the screw heads being sunk and the holes filled with dowel pins or caps.

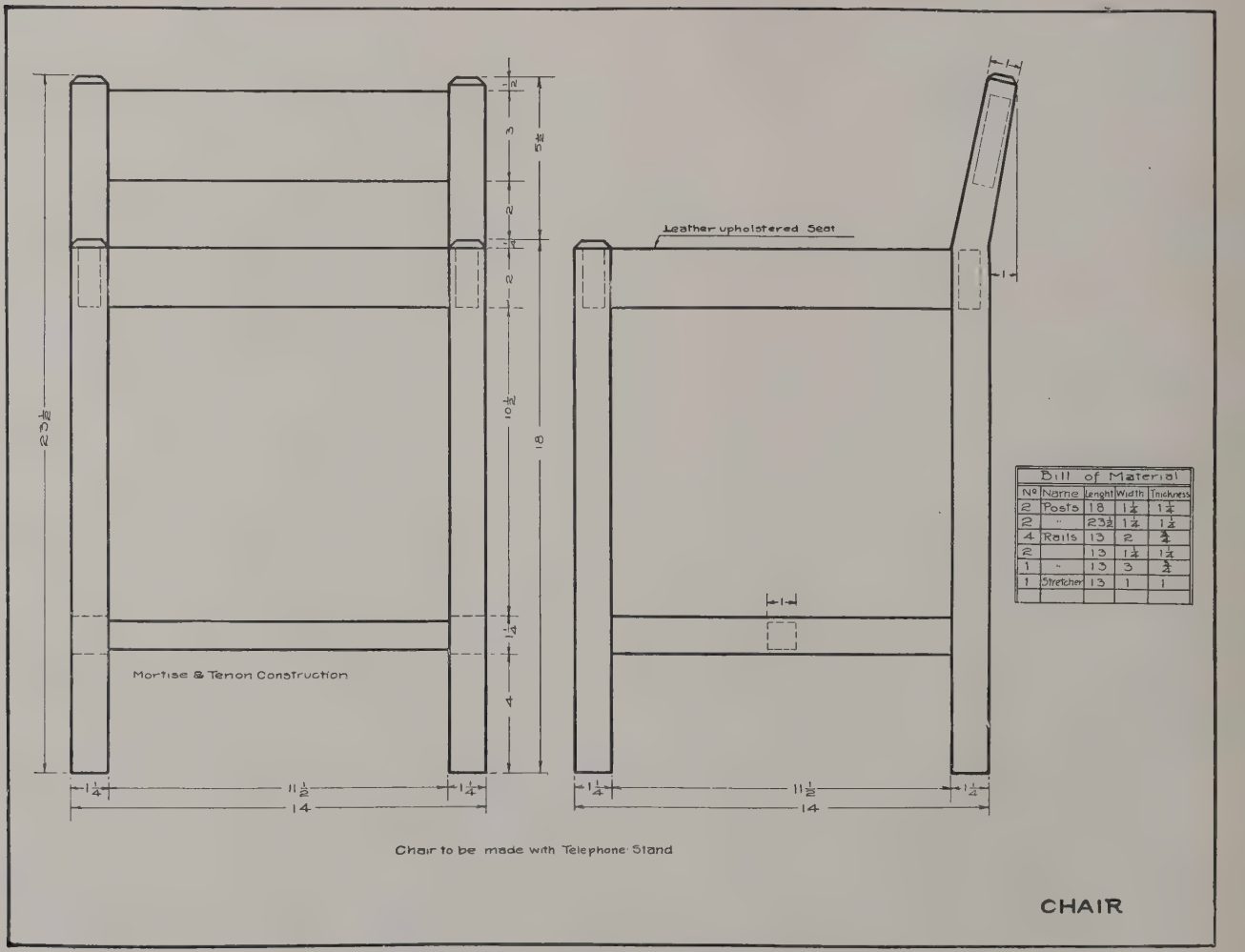


Fig. 38—Working Drawing of Chair (Eighth Grade)

Fig. 39—Telephone Chair

Fig. 40—Telephone Table

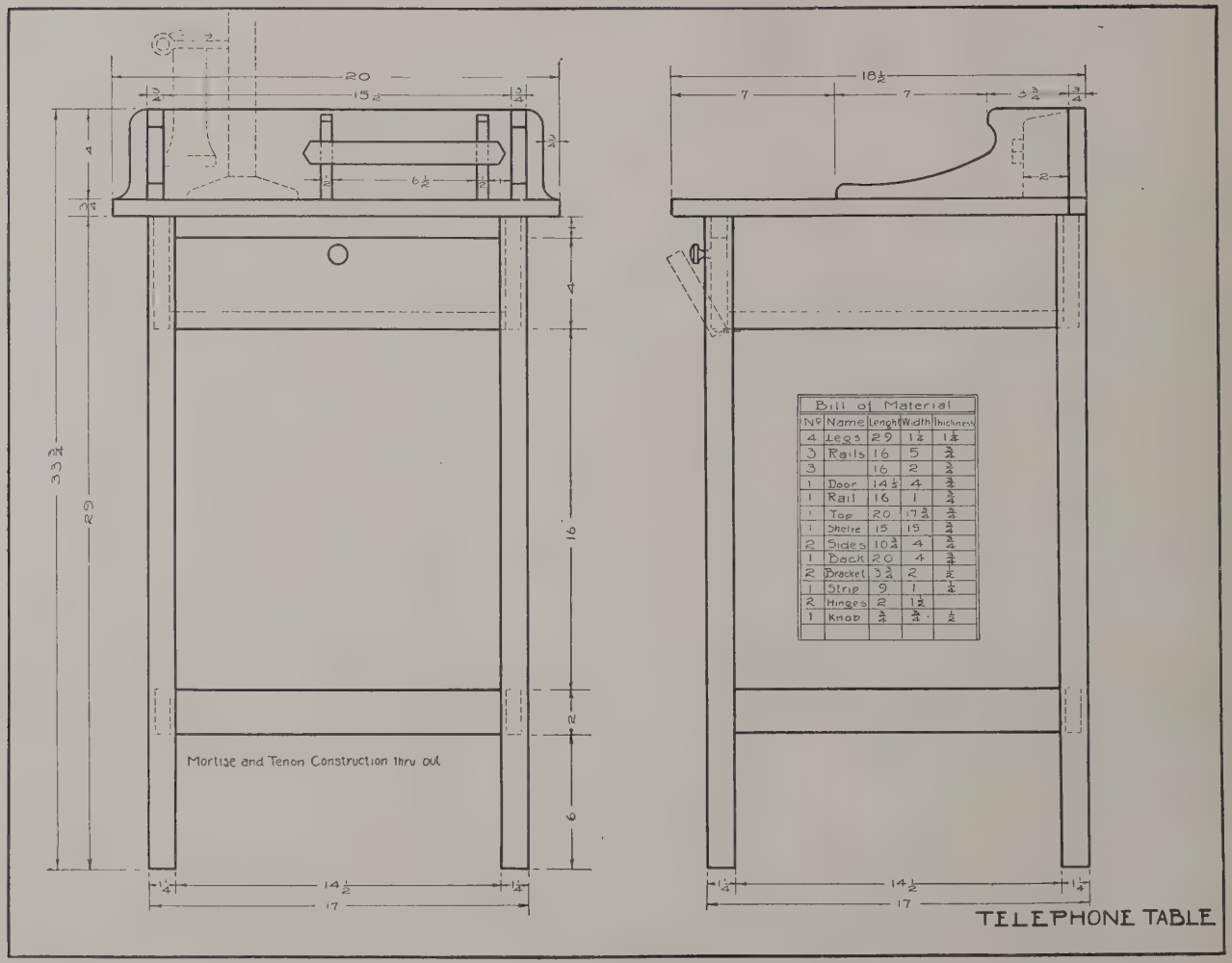


Fig. 41—Working Drawing of Telephone Table (Eighth Grade)

Fig. 42—Telephone Table and Chair

Telephone Table and Chair

In Fig. 42 are shown a telephone table and chair that are surely not to be classed with the ordinary telephone tables and chairs which we find on the market today; and yet there is nothing in the construction of either this table or chair that an eighth-grade boy cannot complete.

Fig. 38 gives the working drawing of the chair, and Fig. 39 shows the completed chair. It may be made either with the mortise-and-tenon, or dowel-joint construction. If there is no band saw at hand the back legs of the chair can be made straight; and if there are no facilities for bending the upper back rail, that may be made straight.* The seat is of the slip seat construction.

Fig. 40 shows the table made from the working drawing shown in Fig. 41. This may be made either the mortise-and-tenon, dowel, or the butt-and-screwed construction as shown. The screw heads are sunk and wooden caps placed in the holes.

Instead of hanging the unsightly telephone directory on the table, it is placed in a little cabinet which is made by screwing in a bottom and hinging the front rail onto this bottom, as shown in Fig. 41. A place is provided on the top of the table for the telephone and next to it a place for a pad of paper.

*Concerning the making of a form for bending stock, refer to paragraph "Making a Form," pages 162-164.

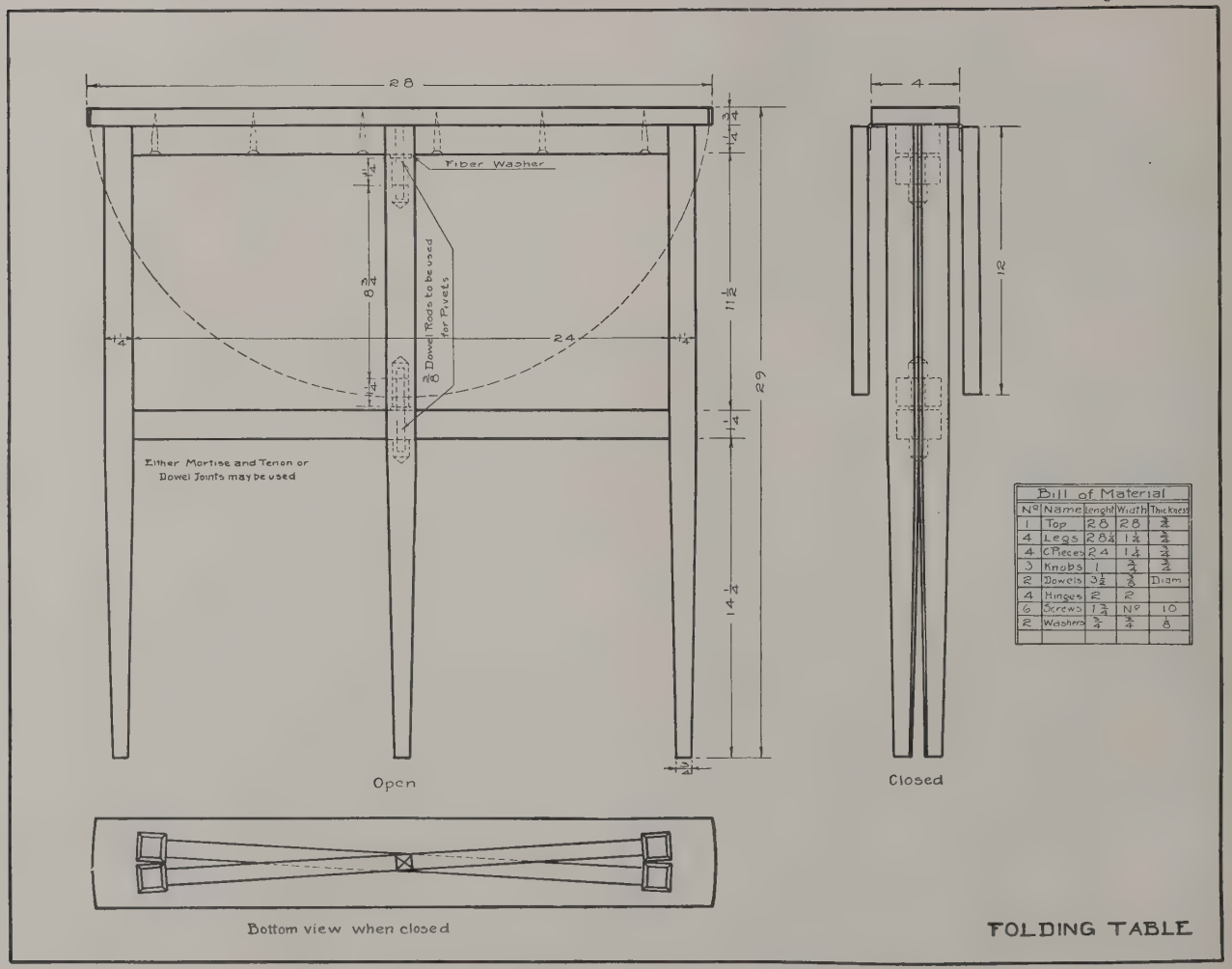
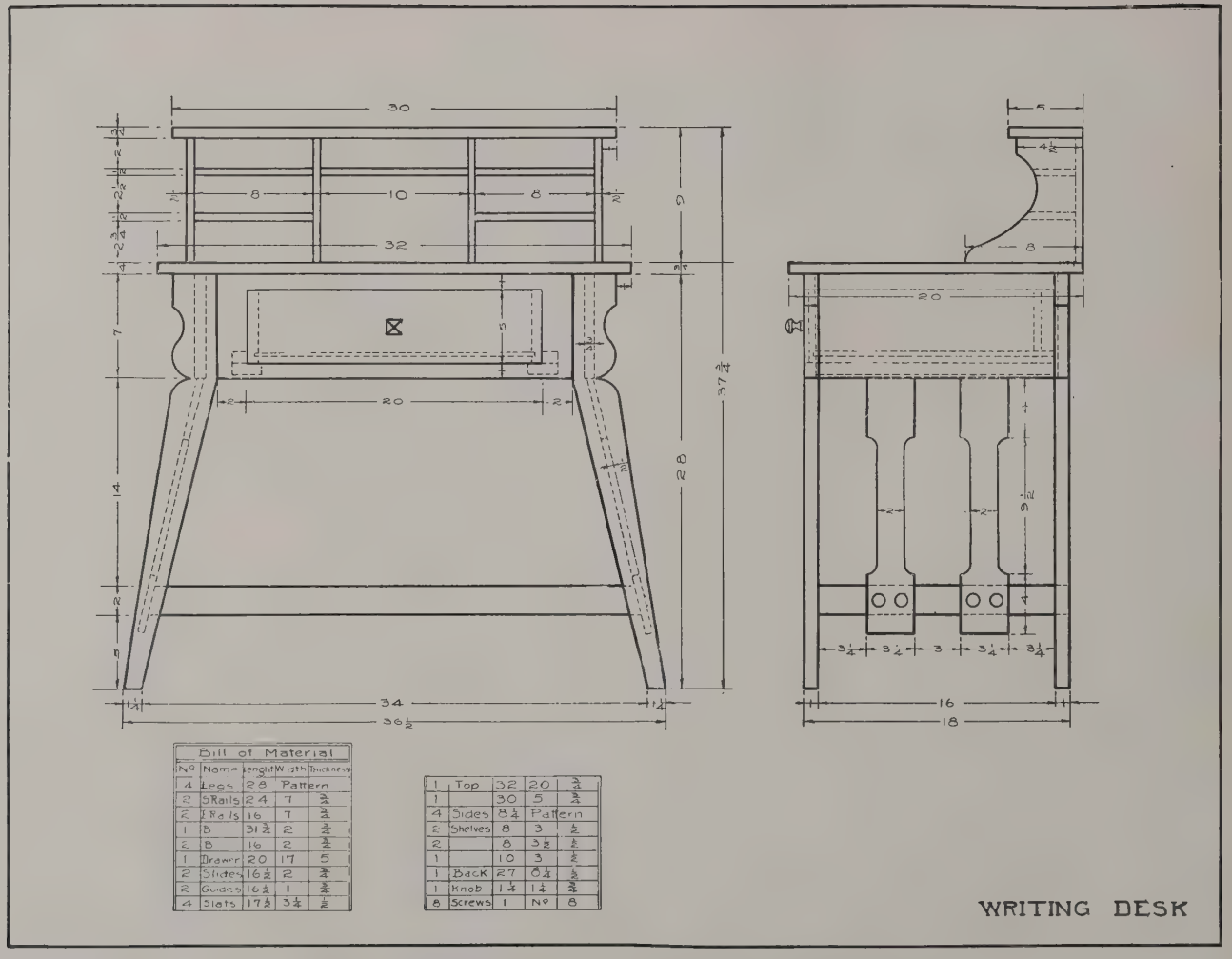


Fig. 43—Working Drawing of Folding Table (Eighth Grade)

Fig. 44—Folding Table



Bill of Material

No	Name	Length	Width	Thickness
4	Legs	28	Pattern	
2	Rails	24	7	¾
2	Rails	16	7	¾
1	B	31½	2	¾
2	B	16	2	¾
1	Drawer	20	17	½
2	Sides	16½	2	¾
2	Guides	16½	1	¾
4	Slats	17½	3¼	¾

1	Top	32	20	¾
1		30	5	¾
4	Sides	8¼	Pattern	
2	Shelves	8	3	¾
2		8	3½	¾
1		10	3	¾
1	Back	27	8¼	¾
1	Knob	1¼	1¼	¾
8	Screws	1	No	8

Fig. 45—Working Drawing of Writing Desk (Eighth Grade)

Fig. 46—Writing Desk

The Folding Table

Fig. 43 shows the working drawing of a very simple and useful folding table, and Fig. 44 shows two of these folding tables, one opened and the other closed. The feature of this folding table is its compactness when closed.

The details of construction are shown very clearly in the working drawing. Either the mortise-and-tenon or dowel construction may be used.

The Writing Desk

In Fig. 46 is shown a writing desk constructed on different lines from those of the ordinary type of writing desks. At the first glance it may seem to be beyond the average eighth-grade boy's ability, but when closely analyzed the construction becomes very simple.

To form the different shapes shown one should use a band saw as there is a great deal of form work on this desk which cannot be done very accurately with a turning saw, by an eighth-grade boy.

CHAPTER II

Electric Lamps

Since more and more homes are being equipped with electricity, the making of electric lamps has become more and more popular with the boys in the manual training classes. It is a very good problem for this work, as it allows of a wide range of design and construction. Any of the more common joints may be used, such as the butt, housed, dowel, and mortise-and-tenon joints, the kind of joint used depending upon the grade in which the lamp is to be constructed. Not only does it allow of a wide range for individual design and construction, but it introduces a little of the elementary science work in the way of electric wiring. Here is a chance for the boys to learn the fundamental principles of wiring for electric lights.

Fig. 47 is a working drawing of an electric table lamp which has been worked out and found to be very satisfactory for elementary manual training classes. With the working drawing are a few suggestions for modifying the base of the lamp, showing the unlimited possibilities for individual design. The teacher should have each boy add something original to the design of his lamp.

Heretofore the one real objection to the making of lamps has been the shades. So far the boys who have made lamps have not been able to make shades to go with them to complete the problem, so they had to purchase some cheap, fluffy fabric shades, which, in most cases, spoiled the otherwise artistic effect of the lamps. But now this difficulty can be overcome by the use of the parchment paper in the making of the shades.

Parchment Lamp Shades

There is no lamp shade that is so artistic, lasting and inexpensive as the parchment shade. The parchment is prepared in the manual training shop by the boys themselves from ordinary white detail drawing paper. The wire frames may be made in the shop or purchased at a very small cost. Either water color or oil paints may be used to decorate the shades and these may be purchased at any of the art stores. The paper that is best suited for the parchment is Dietzgen's White Detail Drawing Paper, No. 70. It comes in rolls 36 in. wide and is sold by the yard. Any amount may be purchased.

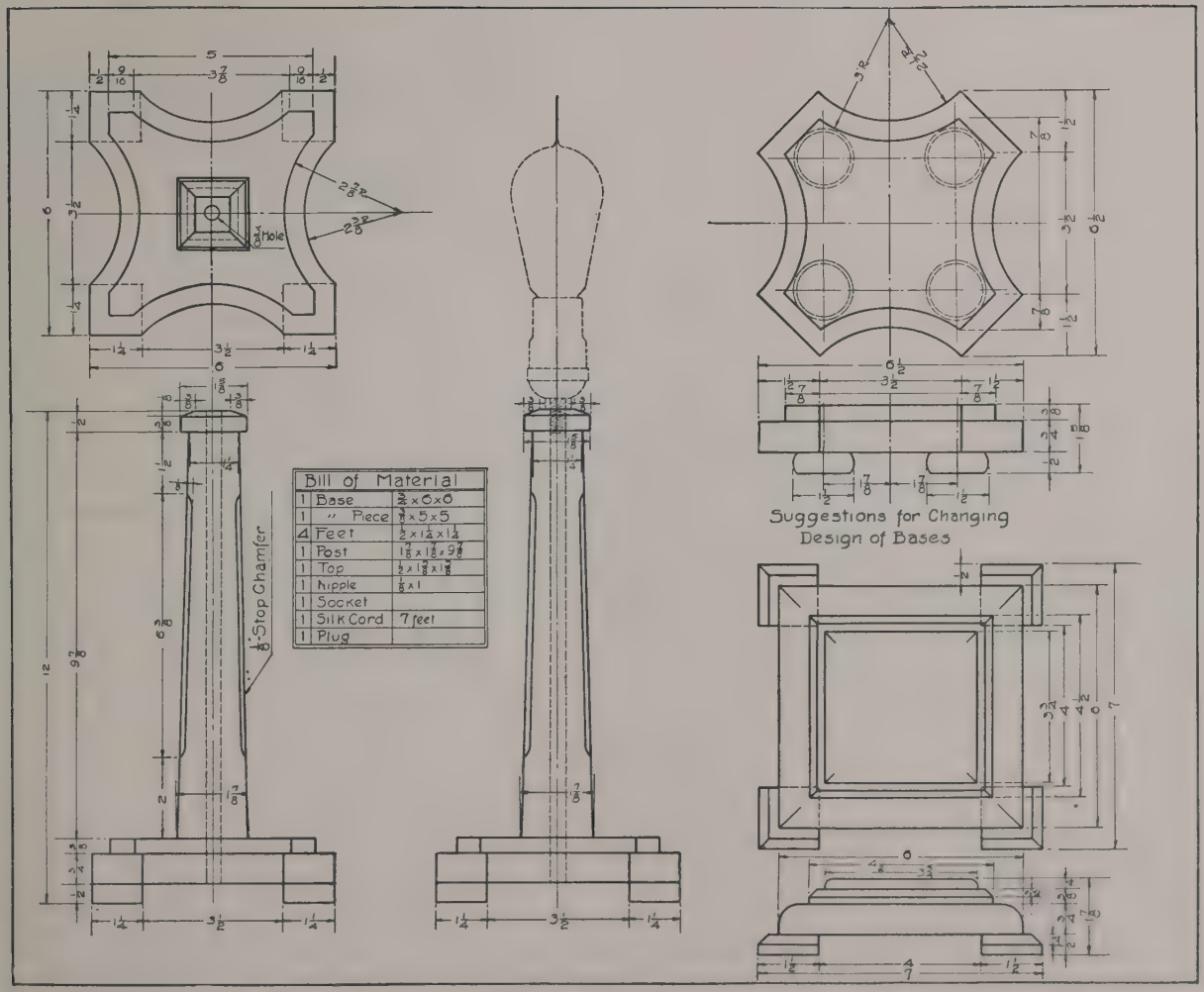


Fig. 47—Working Drawing of an Electric Table Lamp. (Eighth Grade.)

Shapes and Sizes of Shades

There are three styles of circular parchment shades, the Empire shape, the cone shape and the Colonial shape. The dimensions for the Empire shape are as follows:

Diameter of Bottom	Diameter of Top	Height
4 inches	2 inches	4 inches
6	4	4½
8	5	6
10	6	6½
12	8	6½
14	10	8¼
16	10	9
18	12	9½
20	12	10½
22	15	11½
24	16	12

The dimension for the cone shape are as follows:

Diameter of Bottom	Diameter of Top	Height
8 inches	4 inches	5 inches
10	5	6
12	6	6½
14	7	7½
16	8	9
18	9	10

The dimensions of the Colonial shape are as follows:

Diameter of Bottom	Diameter of Top	Height
16 inches	4 inches	6 inches
18	4	6
20	4	6
24	4	6

Cutting the Shade

First decide on the shape the shade is to be, and then, from the foregoing tables, select the size best suited for the lamp at hand. When this is decided upon make a mechanical drawing of the shade, as drawn in A, Fig. 50. The shade illustrated is the cone shape, of a size suitable for the lamp shown in Fig. 47. The bottom diameter is 12 in.; the top diameter 6 in., and the height 6½ in. Prolong the sides of the shade until they meet at a common point A, as indicated by the dotted lines in A, Fig. 50. This completes the cone of which the shade is the frustum. Having the completed cone it is easy to lay out the development of the shade. Take the length of an element of the cone, which is a line drawn from any point on the circumference of the base to the apex or top of the cone, in this case 14 in., as a radius and draw the outer circle as shown in B, Fig. 50. Subtract the width of the shade, 7 in., from the length of the element, 14 in., and with the remainder, of 7 in., as a radius, draw the inner circle as indicated in B, Fig. 50. Measure off on the outer circle, B, Fig. 50, the circumference of the base of the cone or shade, in this case 12 x 3-1/7 or approximately 37¾ in., and allowing ¼ in. for lap the entire length

Fig. 48—Boys at Work

to be measured off would be 38 in. Connect these two points A and B with the center point C and the development of the shade is complete. This may be used as a pattern to cut more shades of the same size and shape.

Fitting the Rings

Before applying the design, the rings must be very carefully fitted to the shade. This is done by allowing the two short edges of the shade to overlap. They are held in place by paper clips.

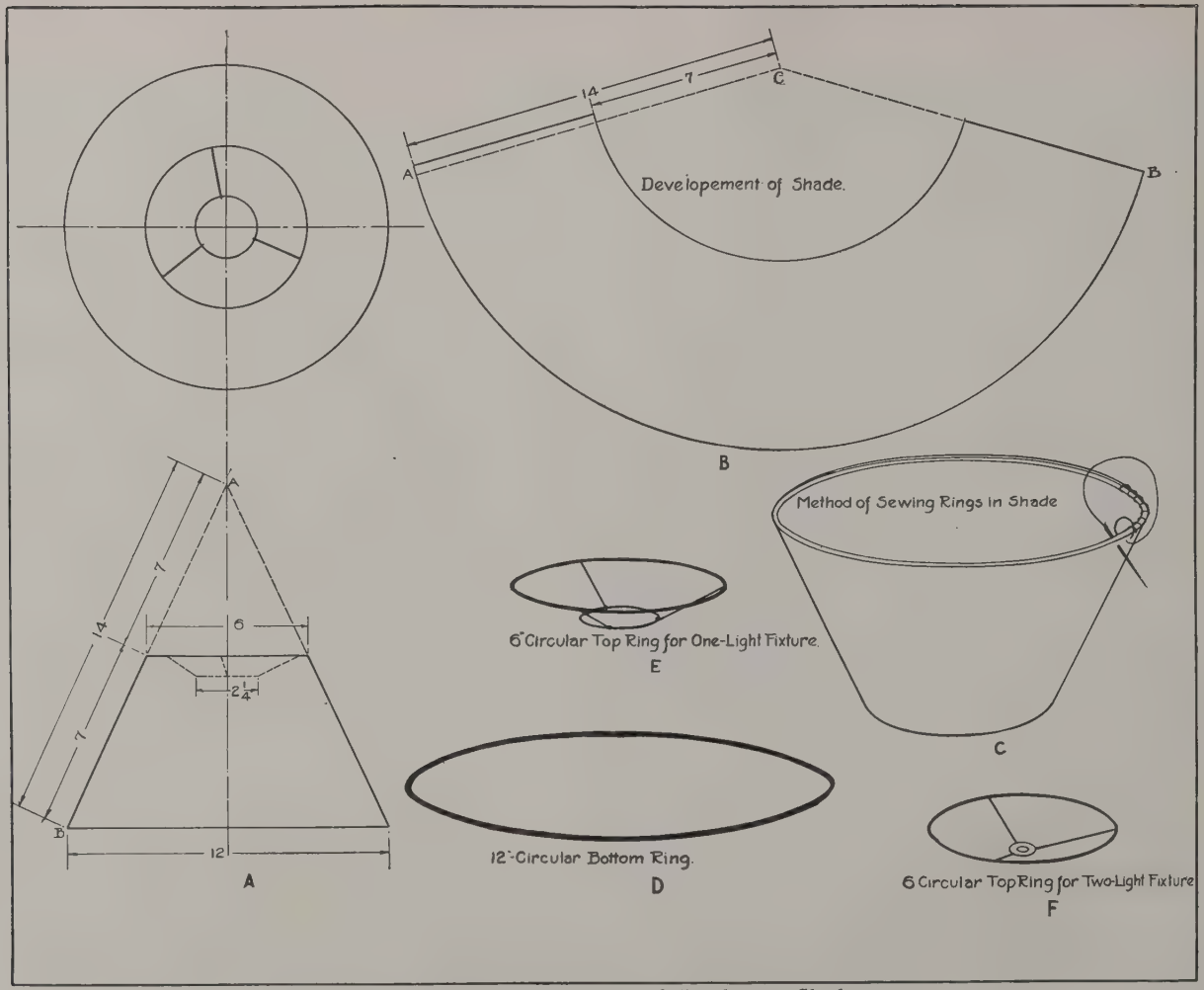


Fig. 50—Working Drawing of Parchment Shade

The boy shown at the left of Fig. 48 is fitting rings to the shade.

After the rings are exactly fitted a light pencil mark is drawn to show the exact place the edges are to come together. An allowance of about ¼ in. is made for glueing.

Painting the Shade

If water colors are to be used, the design is now painted on the shade. When the colors have dried, oil both sides of the shade with boiled linseed oil. After the shade has set for about 15 minutes, wipe off all surplus oil and allow shade to dry for 24 hours. The ends of the shade are now glued together with liquid glue, and the rings sewed in place, using an overcasting stitch, as illustrated in C, Fig. 50. After both rings are sewed in place, a band of braid from ¾ in. to 1 in. in width is sewed over the top and bottom edges to cover over the rings and add a finish to the shade.

If oil colors are to be used the shade is oiled first with the boiled linseed oil, then allowed to dry for 24 hours before the design is painted on.

The lower or bottom rings are always the same in shape, regardless of the size of the shade, D, Fig. 50. The upper rings must be different to meet the different light arrangements. When just one bulb is used, such as the lamp shown in Fig. 47, the upper ring is made as illustrated in E, Fig. 50, the ring setting directly on the bulb. Where a two or three-light arrangement is used, instead of using a ring to set directly on the bulb, a ⅜ in. iron washer is

Fig. 49—Finished Lamps

Fig. 51—Conventional Designs for Parchment Shades

used as indicated in F, Fig. 50, which is fastened onto the top of the fixture.

Designs for Decoration of Shades

The shades may be decorated by using plain, solid color bands, conventional designs of freehand paintings, the amount of decoration depending upon the base of the lamp. If the base is plain, the shade may be elaborately decorated; if the base is moderately decorated, the shade may be decorated with some moderate conventional design; and if the base is elaborately decorated, a very conservative design should be used on the shade.

Fig. 51 consists of a number of conventional designs, adaptable to the parchment shades. The first row are designs based on the butterfly. The top design is of the butterfly almost true to life, the next one is slightly conventionalized, the third is still further conventionalized, and the fourth is purely conventional, so much so that the identity of the butterfly is lost almost entirely.

In a similar manner any object may be taken as a motif and any number of conventional designs made from it.

The second row of designs make most interesting borders. The bottom design shows how the top and bottom bands may be connected by extending the stems from the border to the top band.

The designs may be traced onto the shade and then outlined with waterproof ink. To draw the bands accurately a beam compass should be used.

Electric Lamp

Fig. 53 shows a very attractive little electric lamp, and Fig. 52 shows the working drawing from which it was made. The construction of the post may be a little beyond the ability of the average eighth-grade boy, in which case the design of the post should be changed or modified to come within the boy's capabilities. The rest of the construction of the lamp is very simple.

The wiring of this lamp is very interesting to the boy, besides being very educating. To hold the socket, a hole is bored to fit, rather tightly, a 2½ in. piece of ⅛ in. pipe. The pipe should project out of the top of the post about ¼ in. and the socket should be screwed onto this projection.

The wire frame of the lamp shade may be made by the boy, or he can buy it already made at any department store. The stretching and sewing on of the silk, braid, and fringe may be done by the girls in the sewing class of the school. There are no arms or projections necessary to hold the shade to the lamp, as the wire frame is made to set very firmly on the top of the lamp globe.

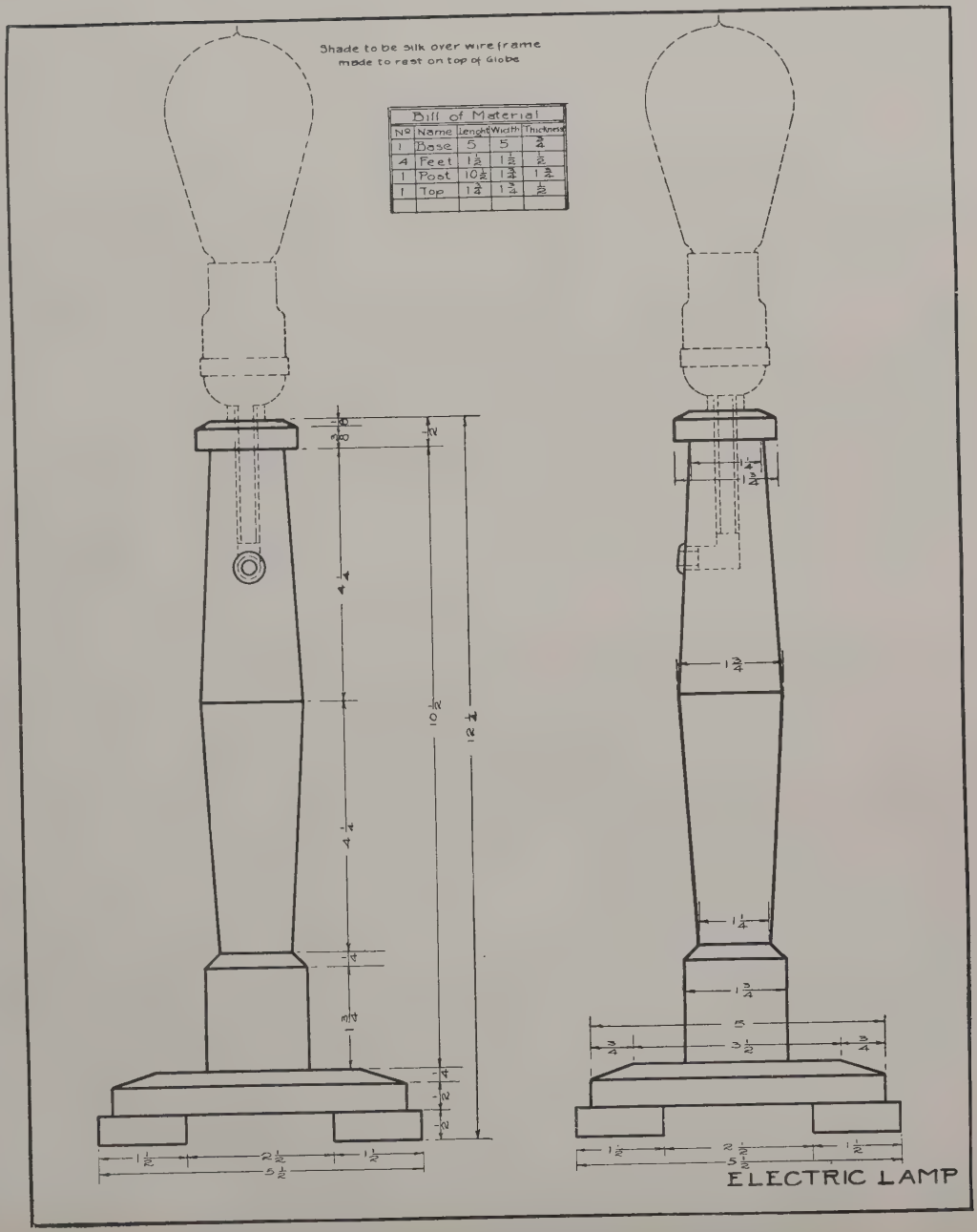


Fig. 52—Working Drawing of Electric Lamp (Eighth Grade)

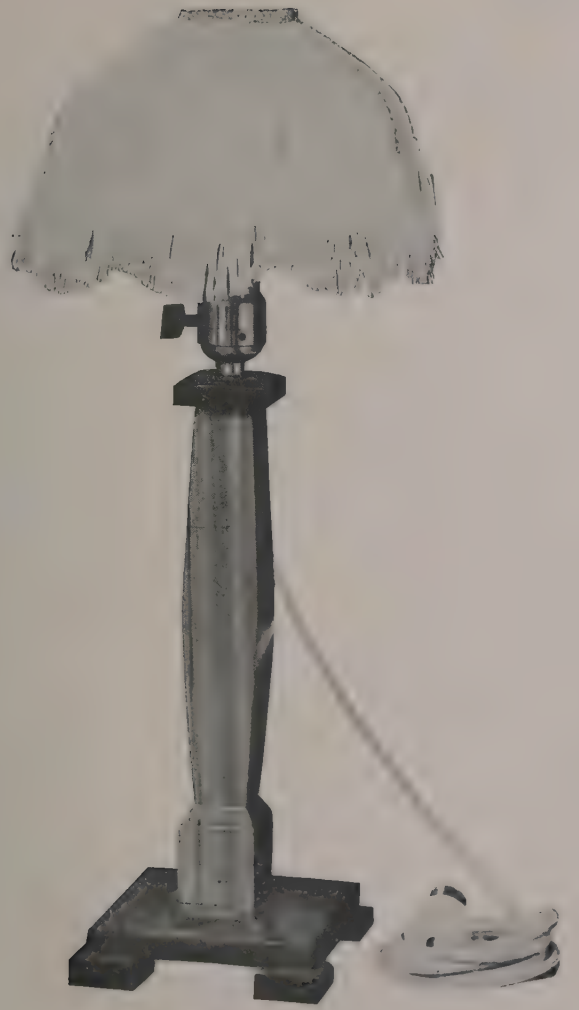


Fig. 53—Electric Lamp

Fig. 55—Floor Lamp

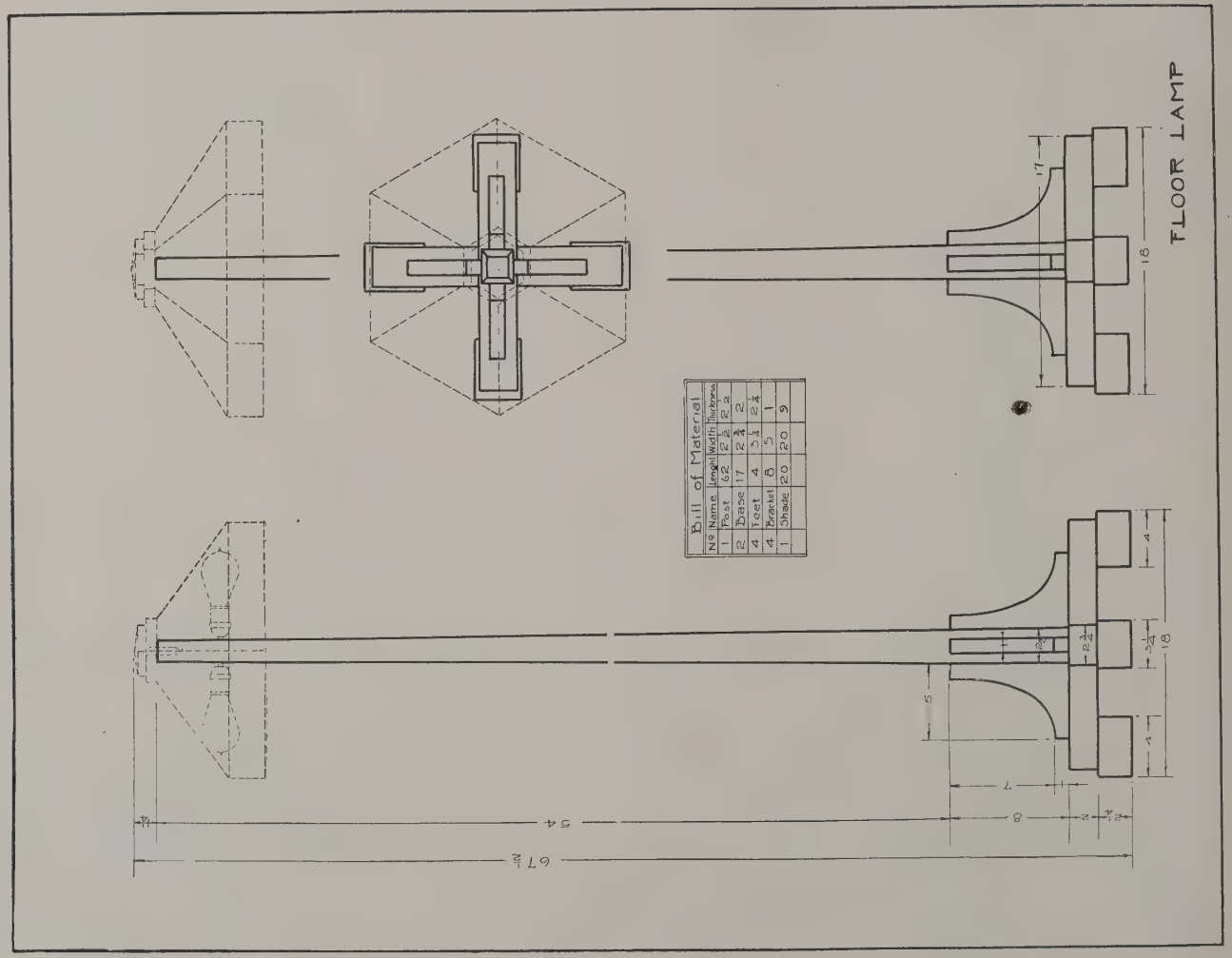


Fig. 54—Working Drawing of Floor Lamp (Eighth Grade)

The Floor Lamp

Since the floor lamp has become a part of the furnishings of the home, we have designed a very simple and inexpensive one, as shown in Fig. 55, which was made from the working drawing shown in Fig. 54, and which any eighth-grade boy can make very easily.

The post tapers from 2½ in. at the base to 1½ in. at the top. It is fastened into the base with a through mortise and tenon joint, and wedged. The braces are then fastened on and, not only do they make the lamp more artistic, but they also make it more solid.

The shade is made of strawboard, and is lined with an inexpensive fabric. A pattern of the sides must first be made, and then the sides may be cut. They are pasted together with strips of bookbinders' cloth, and they are then pasted or tacked to the blocks of wood at the top of the shade, as shown in the drawing. A ½ in. hole is bored in the under side of this block, and a dowel pin is glued into it. A corresponding hole is bored in the center of the top of the post. This is all that is necessary to do to hold the shade on the lamp.

The sockets are placed about 6 in. from the top of the post, and any device may be used to fasten them to it.

CHAPTER III

Metal and Wood

Most teachers of manual training are agreed that flat metal work as a means of decoration has a legitimate place in the shops. The meager equipment required to carry on the work places it within the reach of every shop in charge of teachers who wish to do the work.

Through the introduction of metal, opportunity is given the boy to work in another medium, thus broadening his experience. Among the problems which suggest themselves as being practical are tail hinges, drawer pulls, tray handles, escutcheons, plates for sconces, and an occasional shallow tray to be used with the umbrella rack as shown in Fig. 65, and the smoking stand, Fig. 62 and Fig. 63.

The material and its use create a real necessity for work in design, which should be of vital interest to every teacher of manual training.

In order to design intelligently, it is necessary to know something of the space at our disposal. It is the space which determines whether the applied metal shall be circular, square, or rectangular.

When designing, use paper and scissors freely. The cutting leads to better drawing. When the drawing is completed, it is transferred to the metal. To do this, a piece of carbon paper is placed, black surface down, on the metal to be sawed. The design is placed on the carbon paper and traced. A tracing may be made on rice paper and pasted to the metal. The sawing is done with a metal saw, No. 2 or 3.

The fact that the boys have had experience with the coping saw greatly simplifies the sawing of metal. With a pair of shears and pliers, a saw frame, a drill, metal saw blades No. 2 and 3, a sawing board, and a small clamp with which the board may be clamped to the edge of the table, and a couple of files, very interesing flat metal work may be done.

The trays for umbrella racks require a few blocks which are gauged in such a way as to allow the metal to be shaped in the form of a shallow tray. The exercises suggested in this chapter call for only the most simple work in metal.

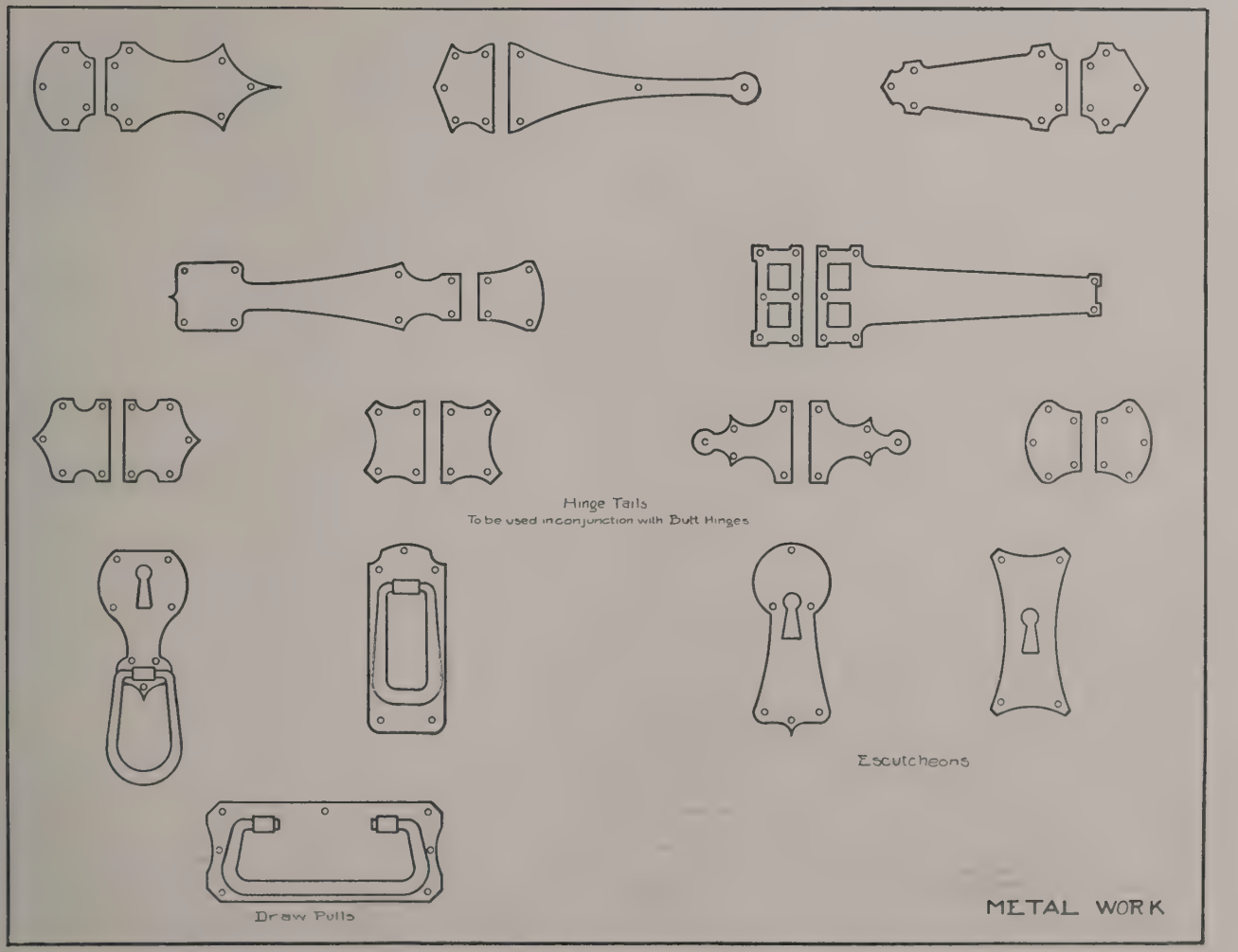


Fig. 56——Designs for Work in Metal (Eighth Grade)

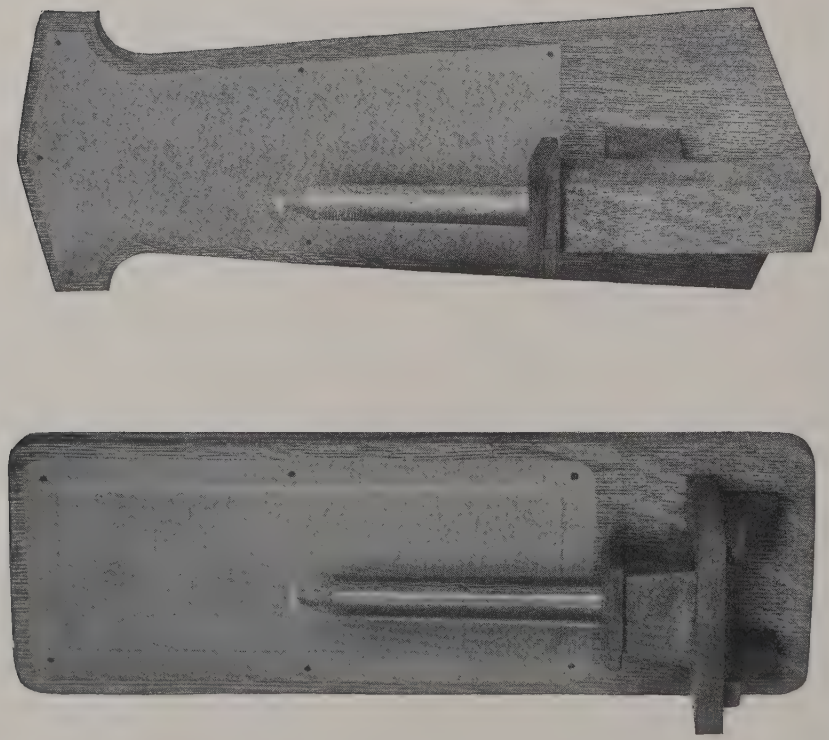


Fig. 57—Candle Sconces

Fig. 58—Stationery Case

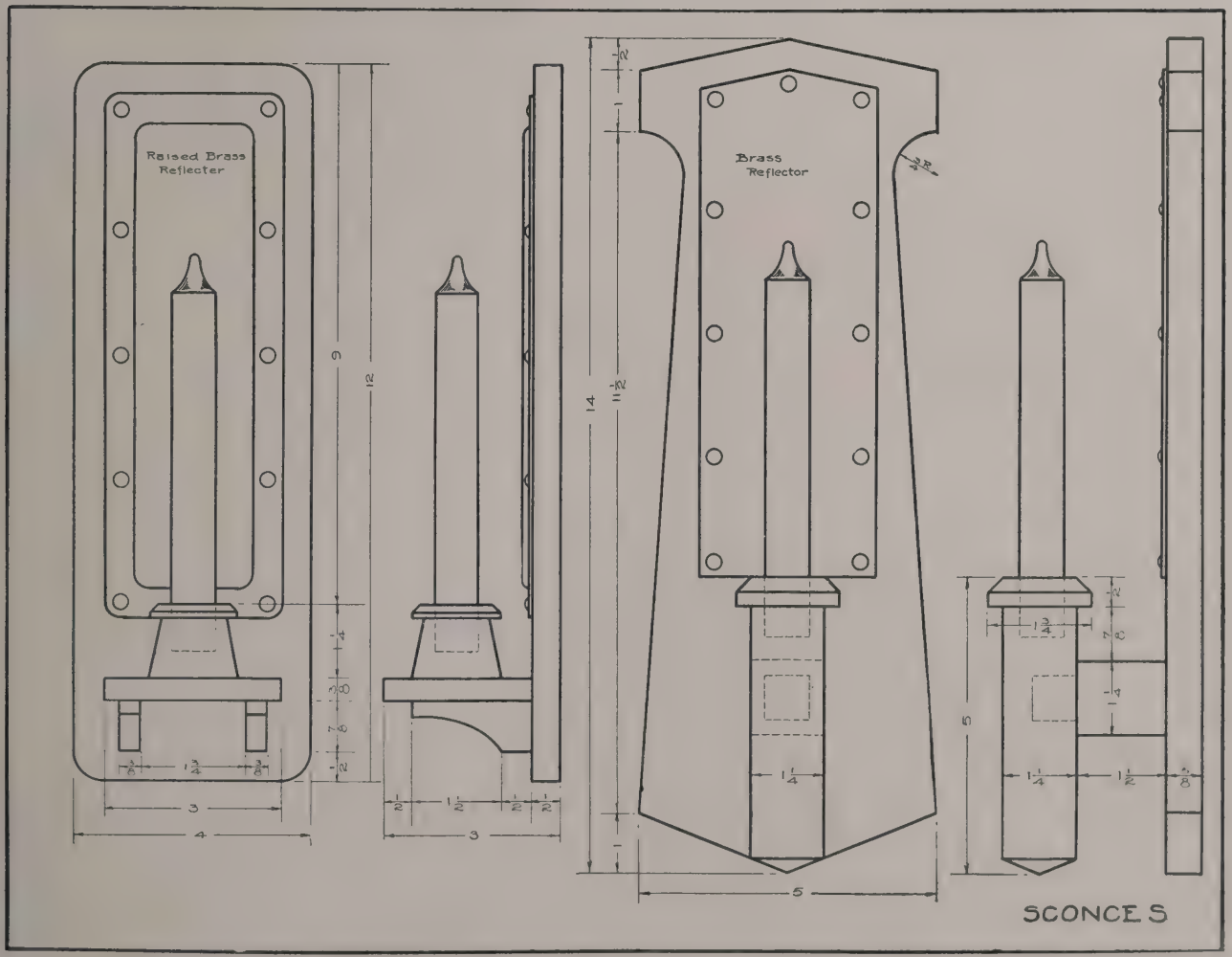


Fig. 59—Working Drawing of Candle Sconces (Seventh Grade)

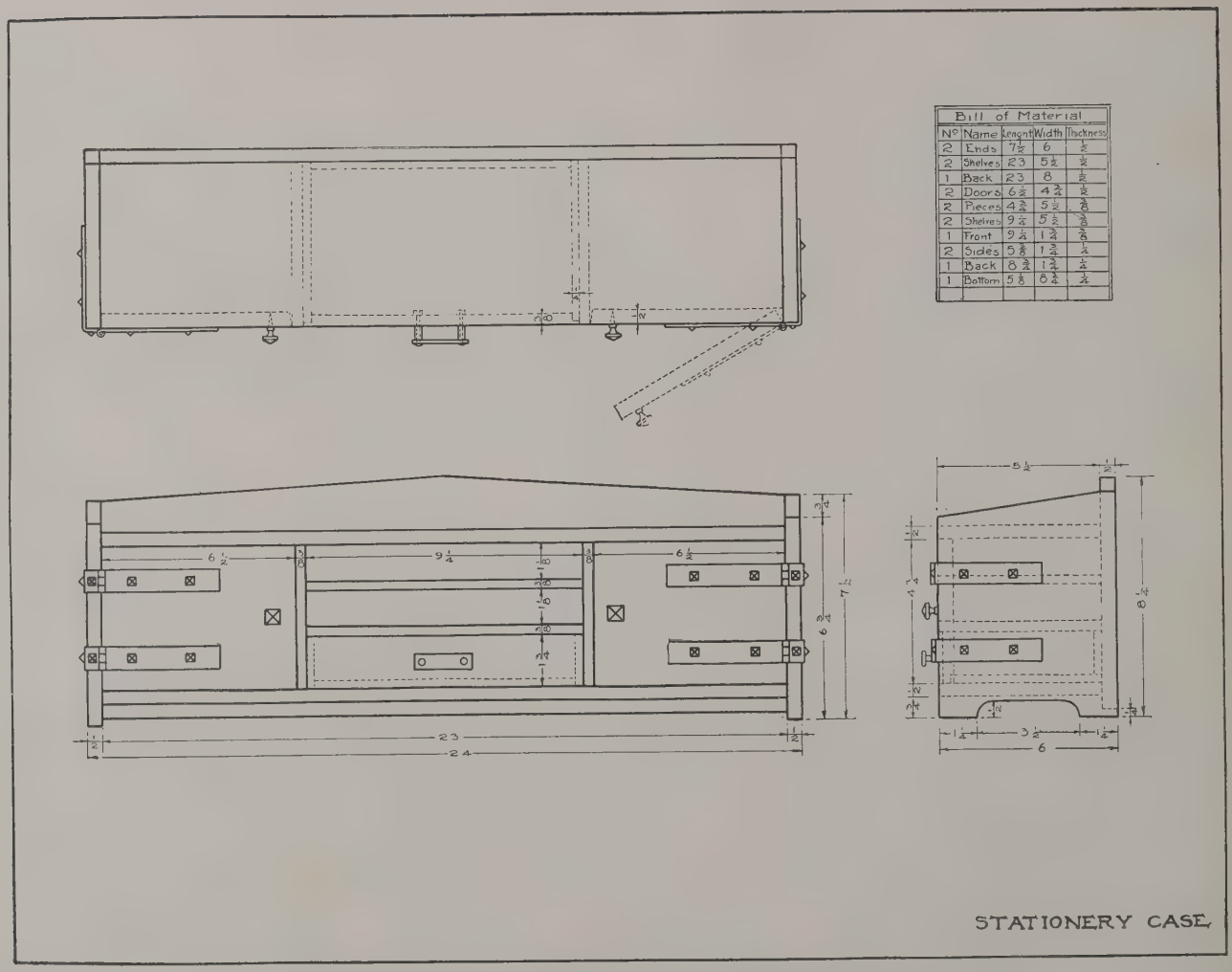


Fig. 60—Working Drawing of Stationery Case (Seventh Grade)

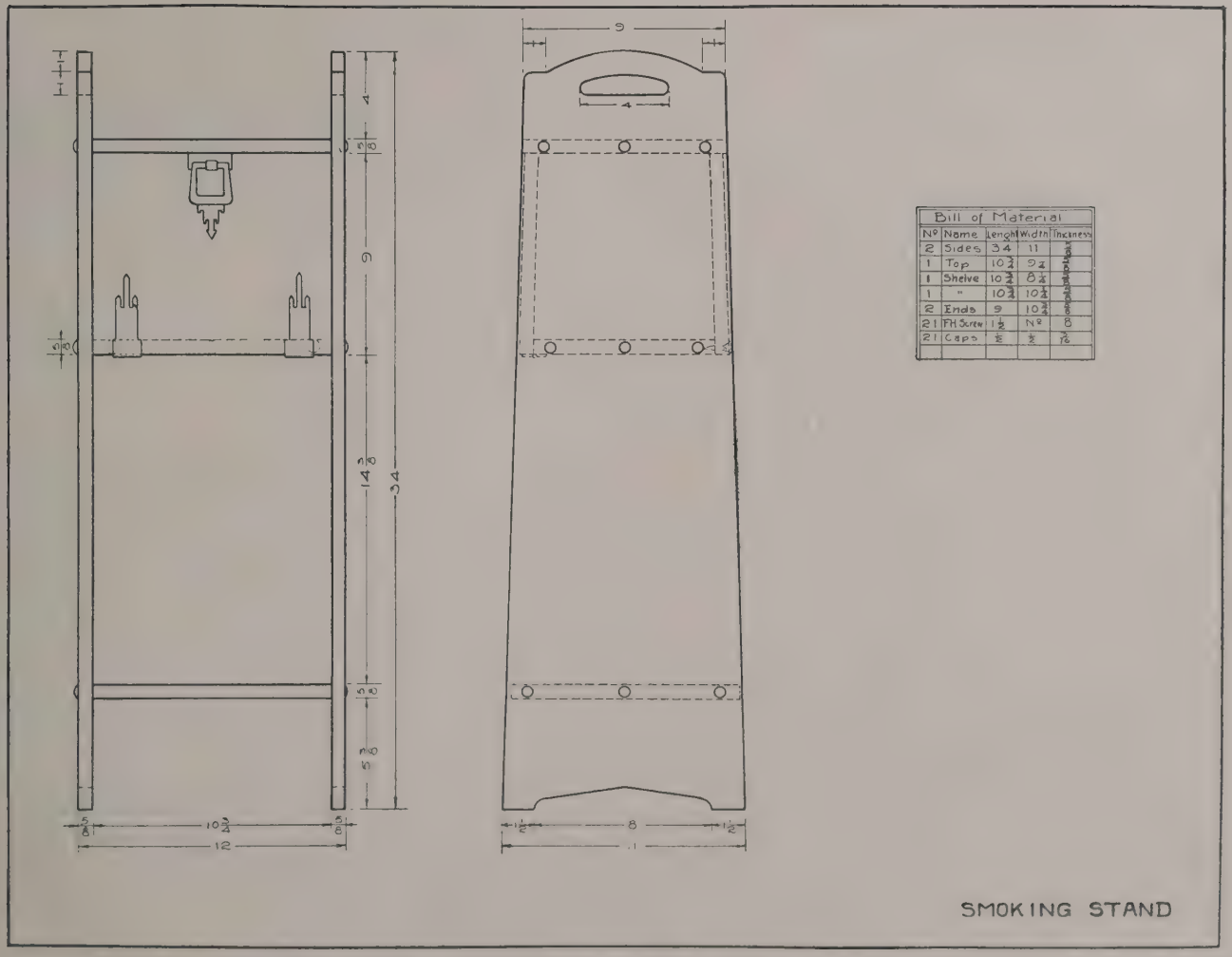


Fig. 61—Working Drawing of Smoking Stand (Eighth Grade)

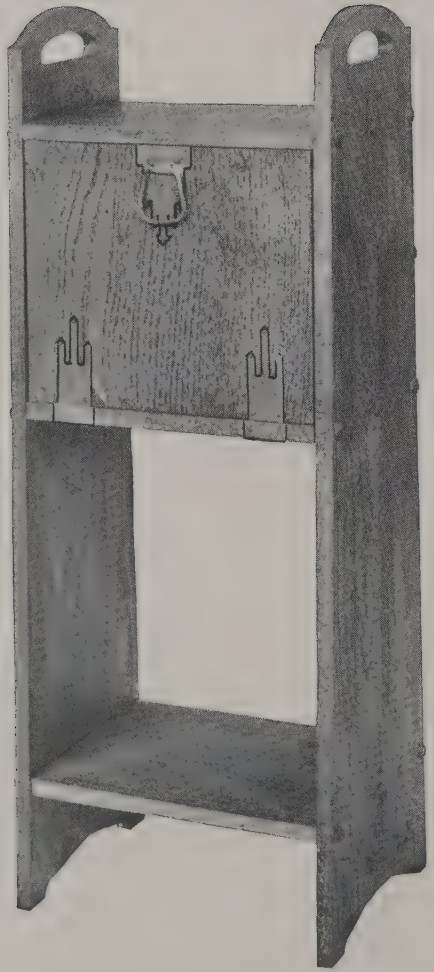


Fig. 62—Smoking Stand

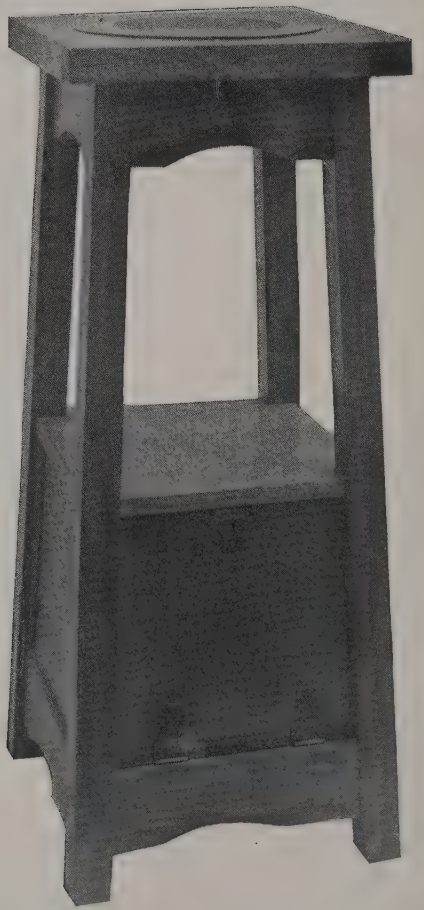


Fig. 63—Smoking Stand

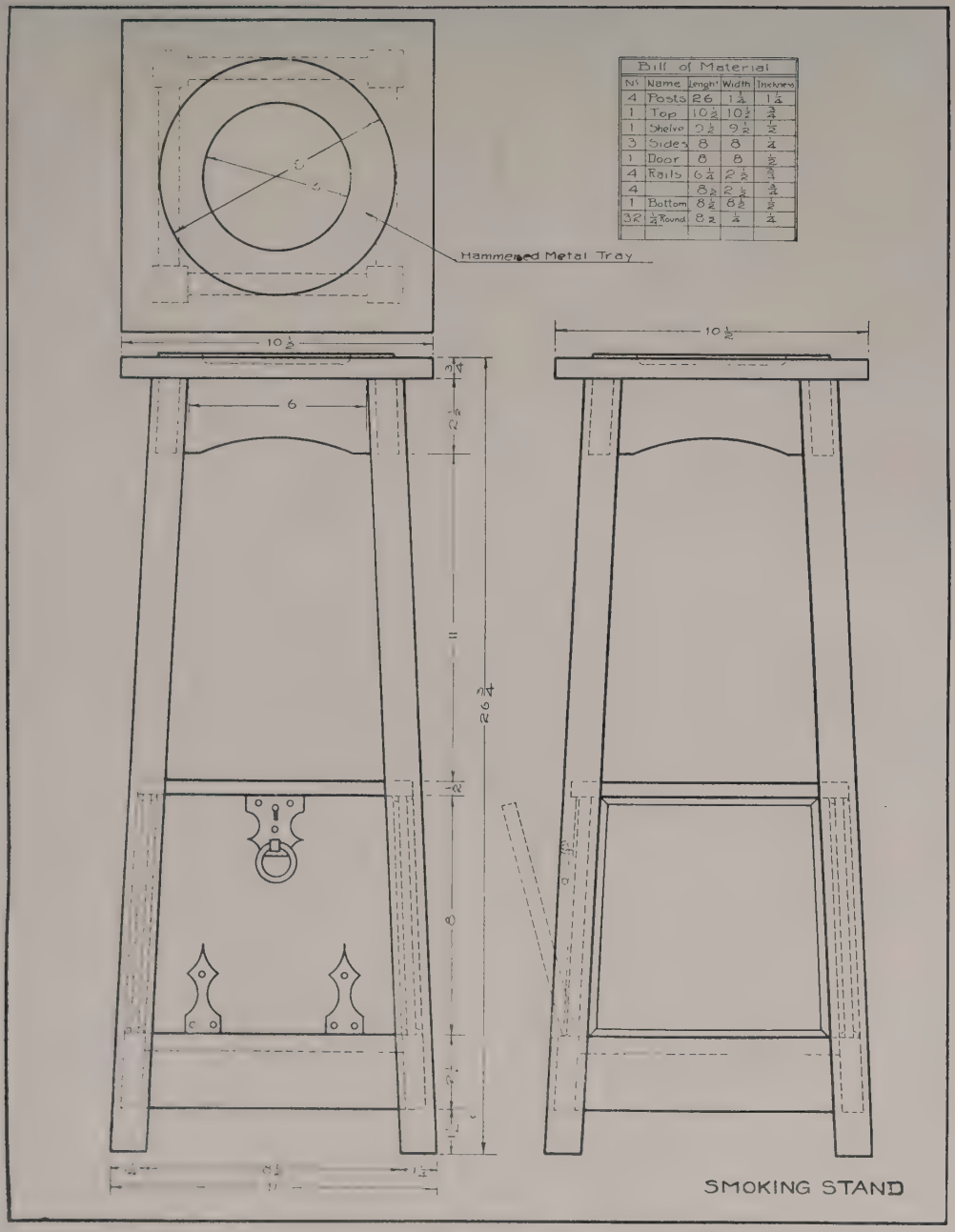


Fig. 64—Working Drawing of Smoking Stand (Eighth Grade)

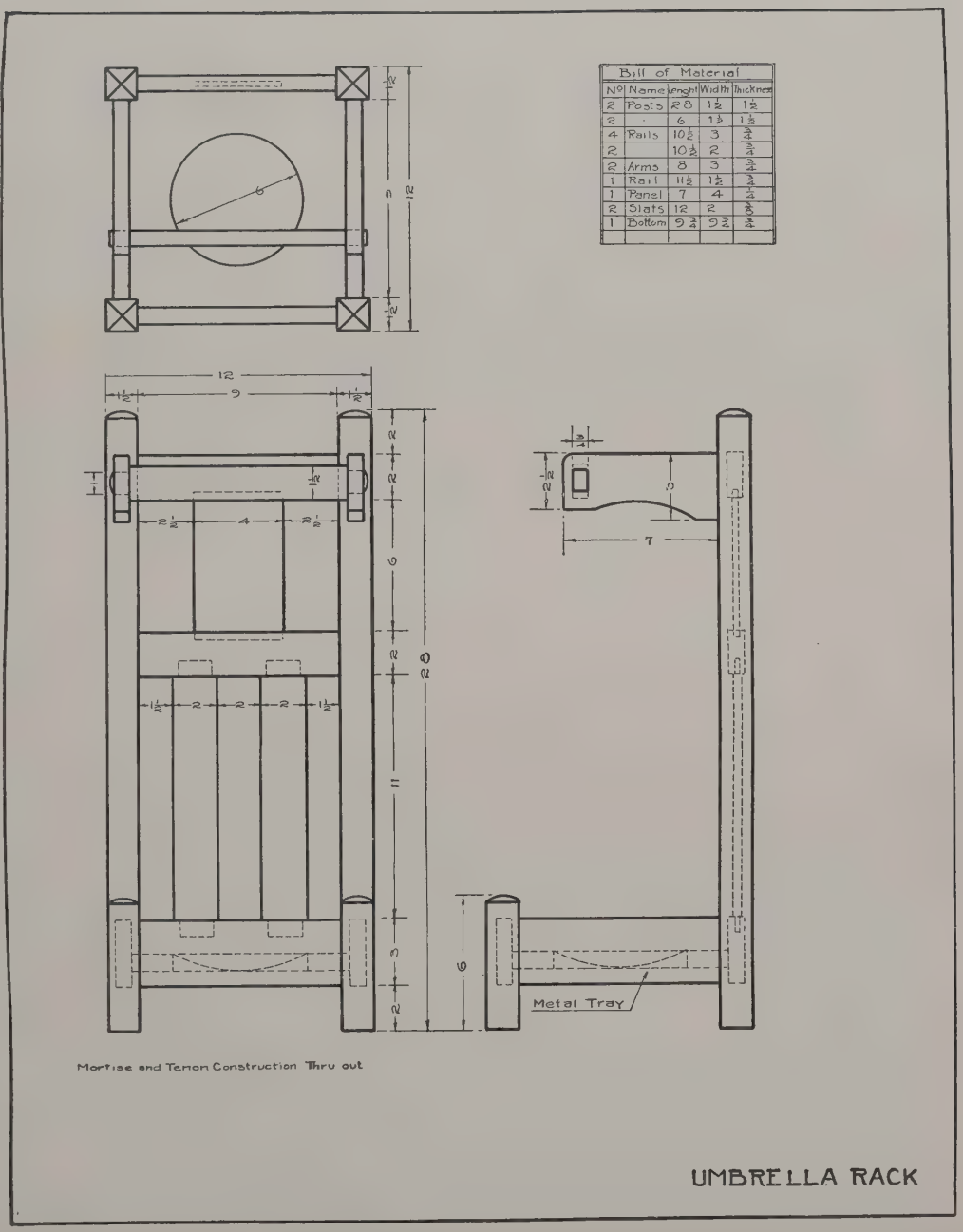


Fig. 65—Working Drawing of Umbrella Rack (Eighth Grade)

CHAPTER IV

Ash Splint Work

Indian splints are the products of oak and black ash, drawn in long, shaving-like bands from logs, with the grain of the wood. Splint is a material very extensively used for basketry by the various Indian tribes living in the northern and the New England states, and various parts of Canada.

Of late it has been used in the manufacture of furniture, in combination with various woods, much the same as willow, cane, pith cane, rushes, and hickory splints. It is a most attractive material used in this way, as it is inexpensive, easily handled, and easily dyed or stained to harmonize with the wood used, and other furnishings of the room in which the finished article is to be placed. It has been found to stand the test of all possible conditions of climate and hard usage of the sun-beaten and frequently storm-swept piazzas, the furnace-heated living rooms, the wind-swept seashore, and mountain bungalows.

The splints, as found in the market, for basketry, trays, and furniture paneling, are in long, shaving-like bands, varying in width from 1½ in. to 2 in., and often several yards long. They are furnished in three weights,—thin, medium, and heavy. Mention should be made at the time of purchase as to the weight desired. Very often the three weights are found in a single coil. This is very convenient in basketry, as the three weights are used in different parts of the same basket. In the retail markets of our large cities, the price is often as high as $1.60 per pound, thus making the work prohibitive in elementary schools. On the other hand, when purchased directly from the producer, the price ranges from 30 to 40 cents per pound.

The expense of sweet grass, which is much used with splints in basketry, makes its use in most schools prohibitive. A three-strand braid of raffia makes a good substitute. In order to make the braid continuous, begin with strands of different lengths, thus allowing no two to run out at the same time. In adding a new strand, the end of the old strand and the beginning of the new are braided as one. This braiding affords a most pleasing occupation for the pupils who are to construct trays and baskets. It may be pursued at home, thus providing occupation for many leisure hours.

Trays and Baskets

One of the great aims of manual training is to combine judgment, a purely mental function, and execution, a purely physical one.

There seems to be no work so suited for combining the two from the beginning as basketry. The material varies so in texture that care and judgment are required in its manipulation, and so few tools are used that the hand must do all, or a greater part, of the work.

In all teaching, the character of the work should be emphasized, rather than the intrinsic value of that which is produced. The aim should be to have work complete in all its parts, as to beauty of design and workmanship, and finished insofar as the completed work coming from the pupil can show his intention, and evince careful and diligent work. The teacher should never hurry the different stages of the work faster than the pupils can go.

The Cutting Gauge

The cutting of splints into desired widths is accomplished by the use of a gauge, as shown in Fig. 66.

The little points of steel which do the cutting are simply pieces of discarded watch springs, which may be obtained at any watch repair shop for the asking. The little knife-like projections are filed after being placed. Each teacher should have several gauges for cutting different widths. The distance between the points determines the width of the splint. The most used splints are $\frac{1}{8}$ in., $\frac{1}{4}$ in., and $\frac{5}{8}$ in.

Cutting the Splints

Press one end of the splint down upon the points, allowing enough to extend beyond the edge of the gauge to make it possible for one to pull the splint while the other holds the gauge and guides the splint,

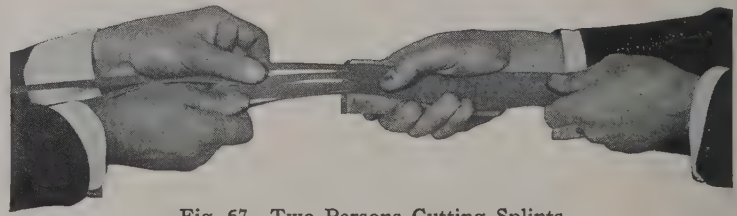


Fig. 67—Two Persons Cutting Splints

Fig. 67. This may be done by one person, by holding the gauge and strip in one hand and pulling with the other, Fig 68.

Making a Small Tray

One of the simplest problems in splint work is the making of a tray. This involves the use of braided raffia. The tray should be 6 in. long, 4 in. wide, and about $1\frac{1}{2}$ in. deep when finished.

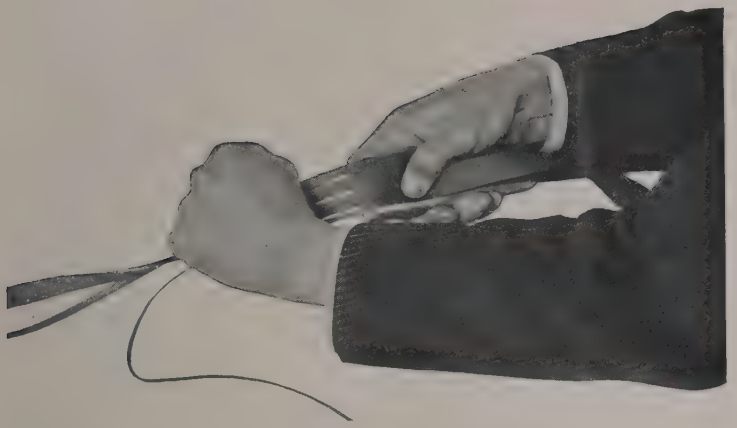


Fig. 68—One Person Cutting Splints

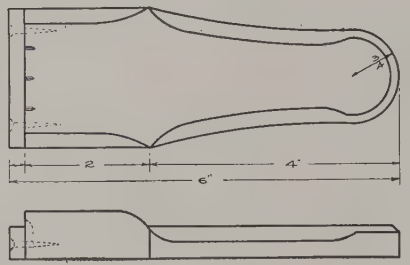
Using the gauge, cut strips $\frac{5}{8}$ in. wide. Dip the splints into water before cutting. It is not necessary to allow them to soak, as in the case of reed. Cut seven strips, each 10 in. long, and nine strips, each 8 in. long. Lay the 10 in. strips in a horizontal position on the desk, and weave the 8 in. strips across, as shown in Fig. 69. A little difficulty may be experienced in weaving the first two strips. To aid in keeping a good shape, blocks of wood are used. The block may be made of soft wood, and squared up by the pupils taking shop work. Blocks of wood might be brought in from carpenter shops or new buildings in the process of construction. Tie the woven bottom to the blocks of wood as shown in Fig 70, allowing the ends to project. The splints, slightly moist, are bent upward around the block, as shown in Fig. 71. It is just possible that the splints will be slightly cracked in the bending. This does not interfere so long as no part falls away.

The weaving with braided raffia is now begun and continued until the weaving is as high as the block is thick.

In the weaving of reed mats and baskets, it was learned that in order to do continuous weaving,—that is, to weave so the weaver passes under one spoke and over the next, there must be an uneven number of spokes. Each time the weaver passes around the tray or basket, a place is reached where it is necessary for the weaver to pass **under** two splints. The weaving is then continued, under and over, until the place is reached where it is again necessary for the weaver to pass under two. This happens each time around.

When the raffia weaving is finished, one strip of the splint $\frac{1}{4}$ in. wide is woven around the top, as shown in Fig. 71. Allow the end of this strip to weave under and over the same spokes as the beginning. This overlapping keeps the two ends together.

Each spoke on the outside of the $\frac{1}{4}$ in. strip woven around the top, is cut pointed, as shown in Fig. 72, turned to the inside, and slipped under the weaving. The other spokes are cut away even with the top edge of the tray, as in Fig. 72.



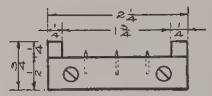


Figure 65

Figure 66

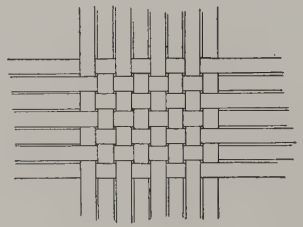


Figure 69

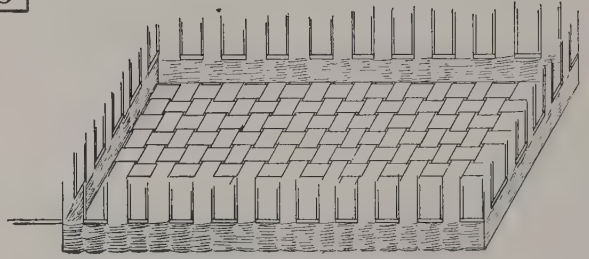


Figure 71

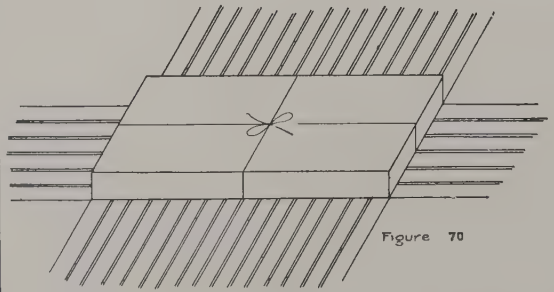


Figure 70

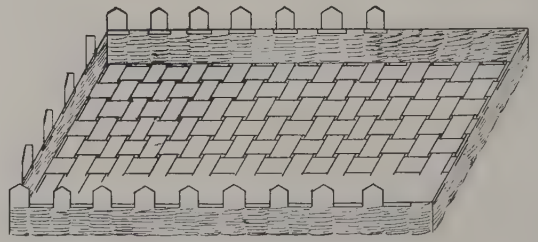


Figure 72

To finish the top edge, take another ¼ in. strip of the ash and about eight strands of raffia. Place the strip of ash on the inside of the tray along the top edge, the bunch of raffia to the outside, and with a darning needle threaded with raffia, overcast around the top so that the raffia and splints are held in place by the overcasting, as shown in Fig. 73. The needle passes between the spokes.

The process, as above described, holds good in all splint work.

To Make Small Circular Basket or Tray

1st: With the use of the ¼ in. gauge, cut a number of strips.

2nd: Cut the ¼ in. strips into 12 in. lengths.

3rd: To arrange the strips for weaving, allow two strips to cross, as shown in Fig. 74. Lay a third strip, as shown in Fig. 75. Place the first finger of the left hand at the point where the strips cross; continue to lay the strips until all have been placed (Fig. 76), raising the finger only to allow a strip to be placed. With the right hand, weave a piece of raffia (single strand) around, (Fig. 77), going under and over as previously described. After two or three rounds, the strips hold together and the finger may be removed.

In circular weaving, there is an even number of ends. This makes it necessary to allow the weaver to pass **under** two strips each time around. After weaving around a few times with the single strand, the braided raffia may be introduced.

The Indians, in making splint baskets, use forms around which the baskets are woven. Fig. 78 shows a number of forms made in wood.

After weaving the bottom of the circular basket, it may be tied to a ciruclar form in wood, as shown in Fig. 79. The weaving may then be continued in either the braided raffia, or a narrow splint may be used for the weaver. In making small circular baskets, the Prang drawing blocks may be used.

The top of the basket is finished by weaving around twice, using the splint, as shown in the finished basket in Fig. 79. In binding the top, a strip of the heaviest ash, ¼ in. wide, is placed at the top on the inside; and instead of overcasting with raffia, as in the tray, a strip ⅛ in. wide of the lightest weight ash is used. No needle is required. The overcasting is done by running the ⅛ in. strip between the spokes and over the top. This is plainly shown in the finished basket, Fig. 79.

Fig. 80 shows a couple of work baskets, one woven in sweet grass and the other in braided raffia.

The basket shown in Fig. 79 is woven of braided rush, with a foundation of ash splints.

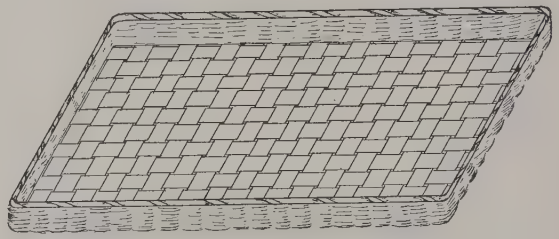
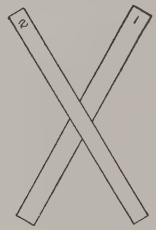


Figure 73



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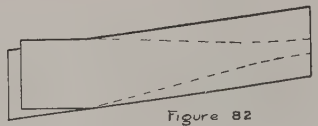

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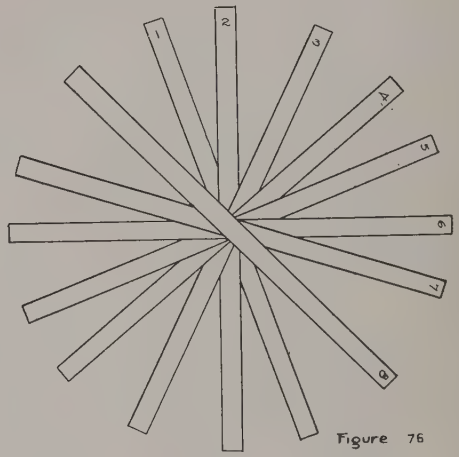

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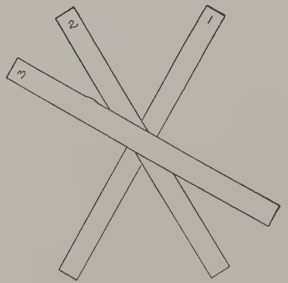

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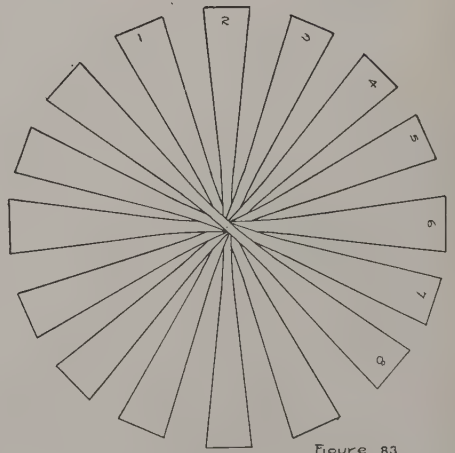


Figure 83

Fig. 77—Weaving Single Strand

Fig. 81 shows other interesting forms of baskets, hair receivers, hairpin holders, etc.

In order that a greater number of spokes may be used as the foundation for a basket, they are often cut as shown in Fig. 82. This is done by moistening the splint, folding it into halves, and then cutting it with scissors. The spokes are then crossed, as shown in Fig. 83, and the weaving done the same as above described and shown in Figs. 77 and 79.

To Make a Cover

Proceed as when making a basket. When the weaving has reached a diameter sufficient to cover the opening in the basket, remove it from the block and tie it to the top of the basket.

The cover is finished by bending the spokes downward on the outside of the basket, and the weaving is completed. In this way the cover is bound to fit the basket. The cover of the basket is finished the same as the top of the tray. Figs. 80 and 81.

Baskets the size of those shown in Fig. 80 should have foundation spokes from ½ in. to ⅝ in. in width.

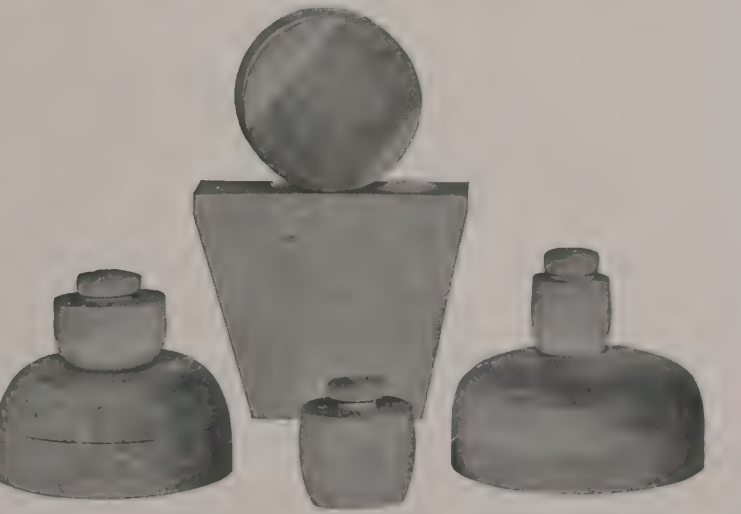


Fig. 78—Wooden Forms

Fig. 79—Finished Basket, Roll of Splint, Basket Tied to Form

Fig. 84 shows two interesting work baskets, one made of sweet grass and splint, and the other of raffia and splint.

Combination of Wood and Splints

Wood alone is not sufficient for a course in elementary manual training. Under proper guidance, such materials as splints of ash, oak and hickory, cane, pith cane (flat reed), rushes, split and round reed, bits of metal, and simple upholstering in leather, hand-woven fabrics and tapestry may be

Fig. 80—Finished Work Baskets

used in conjunction with wood, thus adding greatly to an appreciation of constructive design so often lacking in work done in manual training shops. If there is any doubt as to the commercial value of combined materials as above mentioned one need only consult a salesman from any first class furni ture establishment regarding prices.

Figs. 85 and 86 show two simple weaves in paper which may readily be duplicated in splints. The diagonal weave in Fig. 85 is the one used in the panels of the wastebasket shown in Fig. 90, and also the panels of the screen shown in Fig. 88, while the weave in Fig. 86 shows the pattern used in weaving the sides of the tabouret, shown in Fig. 94. It is well to have the members of a class doing this work first experiment in paper-weaving.

If the pupils have pursued paper-weaving in the lower grades the knowledge there gained will serve them well at this time. If they are doing the work for the first time, the simplicity of it and the rapidity with which it can be done will greatly please them.

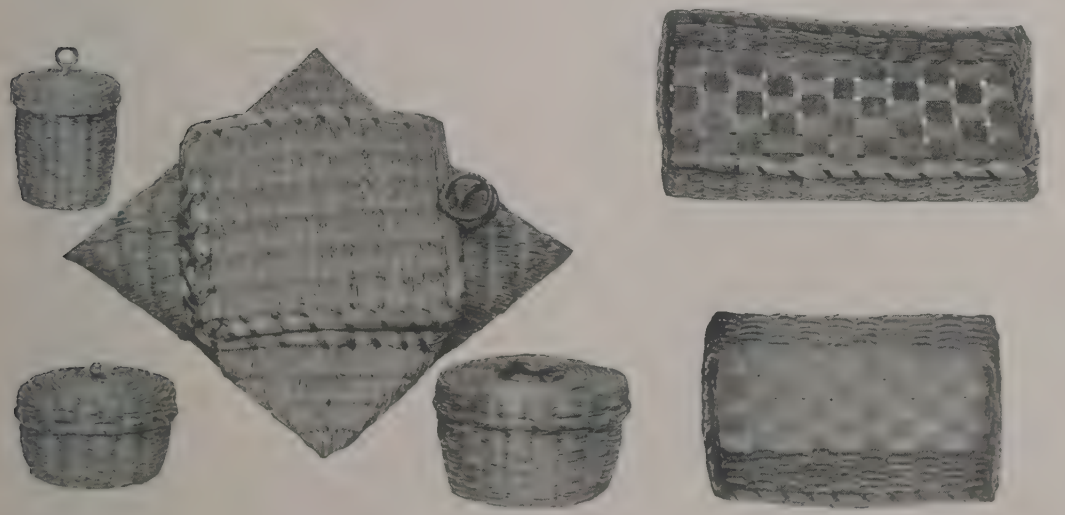


Fig. 81—Other Forms of Baskets

Observe that in the diagonal weave, Fig. 85, the weaver the first time across passes under two splints and then over two, etc. The second time across, the weaver passes under one, then over two and under two until across. The third time the weaver passes over two, then under two, until across. The fourth time across, the weaver passes over one, then under two, over two, etc. The four above

changes are all that are necessary to produce the diagonal weave.

Continue the weaving by having the fifth weaver the same as the first, the sixth the same as the second, the seventh the same as the third, and the eighth the same as the fourth. This order is followed until the entire panel is finished.

Fig. 84—Work Baskets

To weave the pattern as shown in the tabouret, there must be an uneven number of vertical strips, Fig. 86.

It will be observed that the weaver starts out by passing over two, under two, and then over three. This must be so because of the uneven number of vertical splints.

The next weaver starts out by passing under one, over two, under two, and then over one, this being the center.

The third weaver starts out by passing under two, over two, and then under three.

The fourth weaver passes over one, under two, over two, and under one.

The four above changes are the only ones in the entire pattern. To continue allow the fifth weaver to follow the same course as the first one, etc.

Observe that every other weaver passes either under or over three vertical strips.

When the center of the panel is reached, the second half is just the reverse of the first. In other words, weave

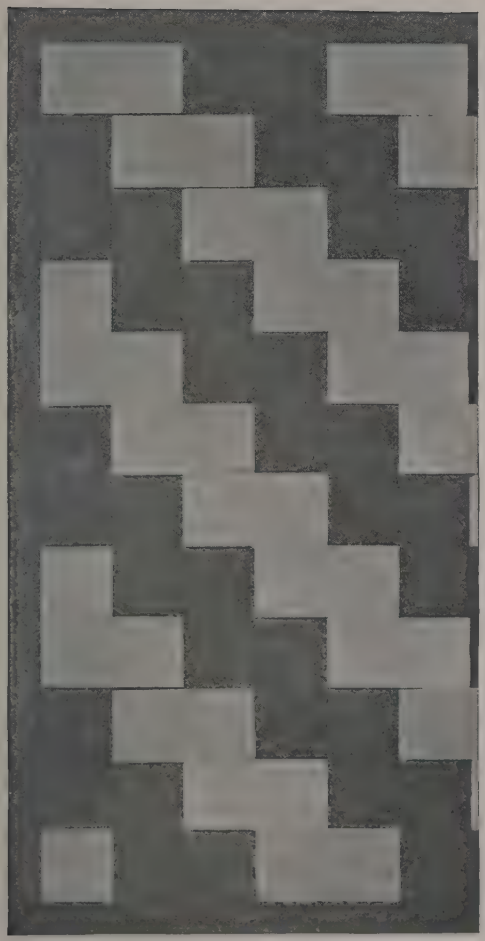


Fig. 85—Diagonal Weave

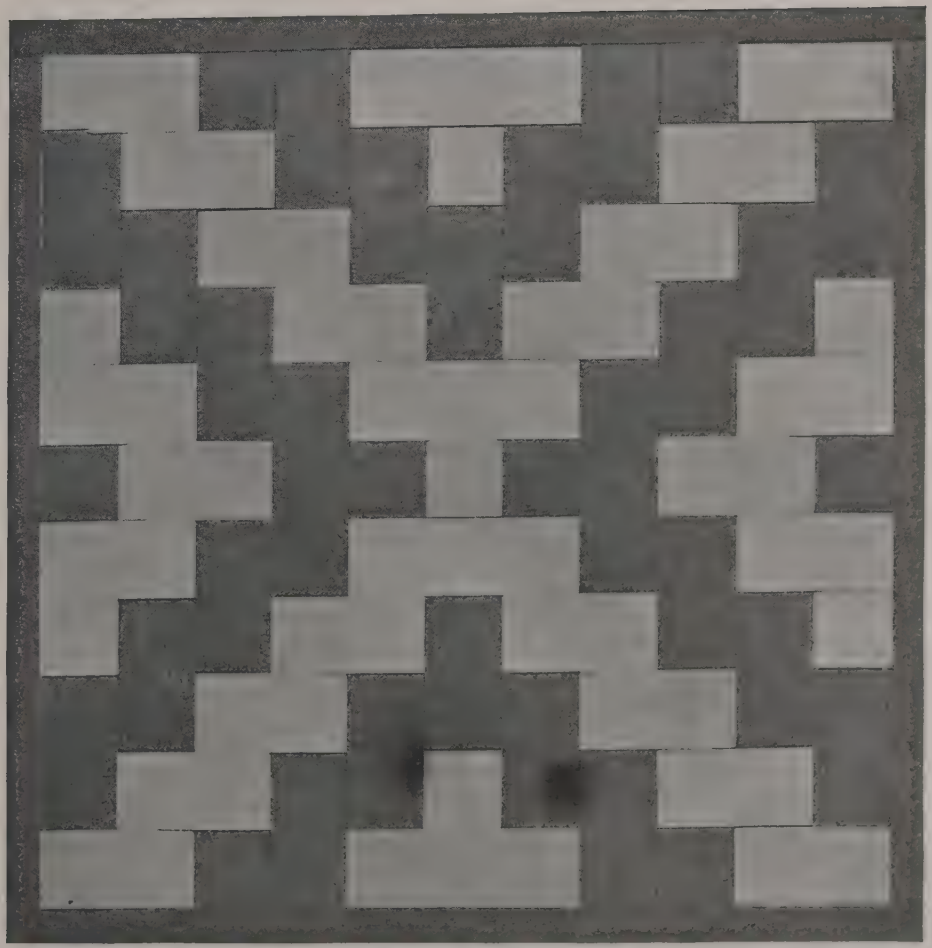


Fig. 86—Pattern Weave

backward by allowing the first weave below the center to follow the same course as the one just above the center.

The unfinished screen in Fig. 87 shows the various stages of the weaving.

The material is moistened the same as when used in baskets. The strips used in the accompanying exercises are all cut ½ in. in width. To weave the panels in a screen, proceed as follows:

1st: Cut strips.

2nd: Tack the strips to the upper cross-piece of the screen, as shown in the panel to the right (Fig. 87), allowing the strips to hang as shown in cut. Use 1 oz. iron tacks. These may be purchased in the curtain section of any department or hardware store.

3rd: Cut strips to be woven across about two inches longer than the distance across the panel. Begin to weave at the top, as shown in center panel, Fig. 87, and continue until the entire panel is completed. The tacking at the bottom and sides should not be done until the splints have thoroughly dried.

Before tacking, push the cross-pieces one by one as close together as possible.

It will be found that owing to the drying out, considerable space will be left at the bottom. Weave in additional pieces to fill this space.

4th: Before tacking, moisten all ends to be tacked to prevent splitting. Draw each vertical splint until it is perfectly tight, and then tack. Tack the strips down one side. Draw the opposite ends until the weavers are tight and then tack. When completed, the panel will look like the one shown to the left, Fig. 87.

Fig. 89 shows the finished screen with 1 in. trim covering the tacked edges.

Rabbet the trim about 1/32 in. in depth and ¾ in. in width. This makes it possible for the trim to fit the face of the panel perfectly. Fig. 88 shows the working drawing for the screen.

Fig. 90 shows a finished waste basket. This is a problem easily constructed by pupils of the seventh grade. Fig. 91 shows the working drawing of the waste basket.

The mitered strips which cover the tacked edges are only ¼ in. in thickness. The 1 in. trim might have been used the same as in other problems suggested.

The working drawing for the basket shows nothing but butt joints.

The panels for the basket are woven by tacking the strips to a drawing board.

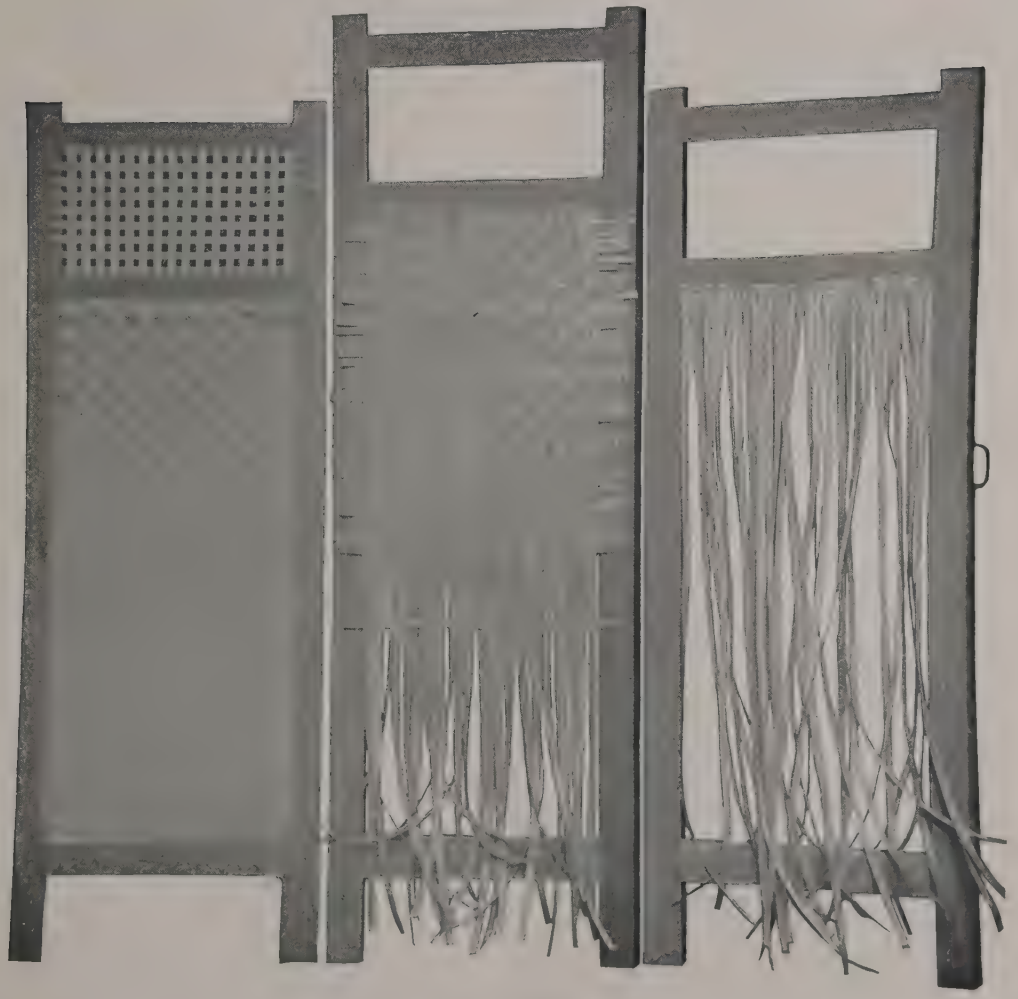


Fig. 87—Steps in Splint Weaving

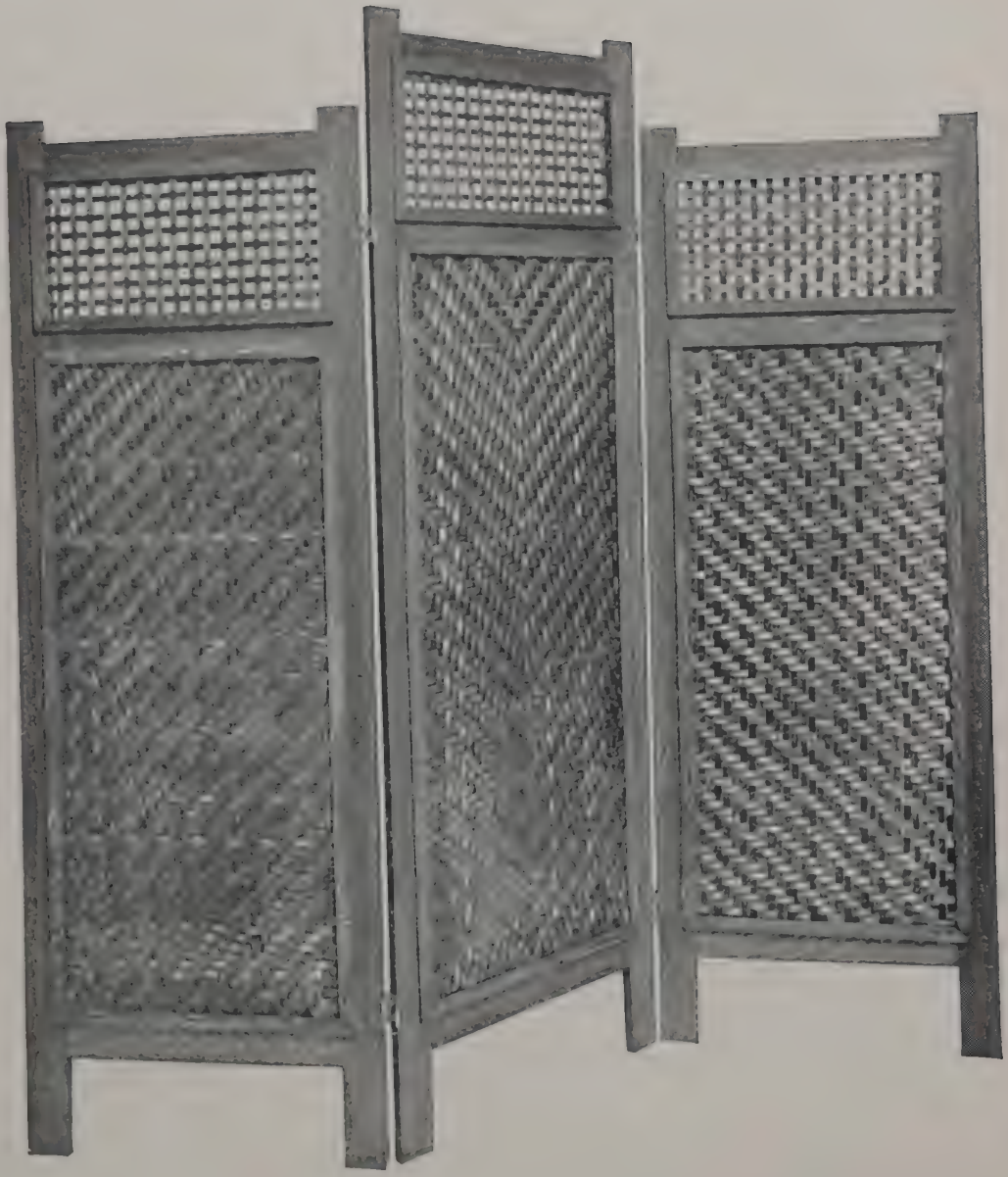


Fig. 89—Splint Woven Screen

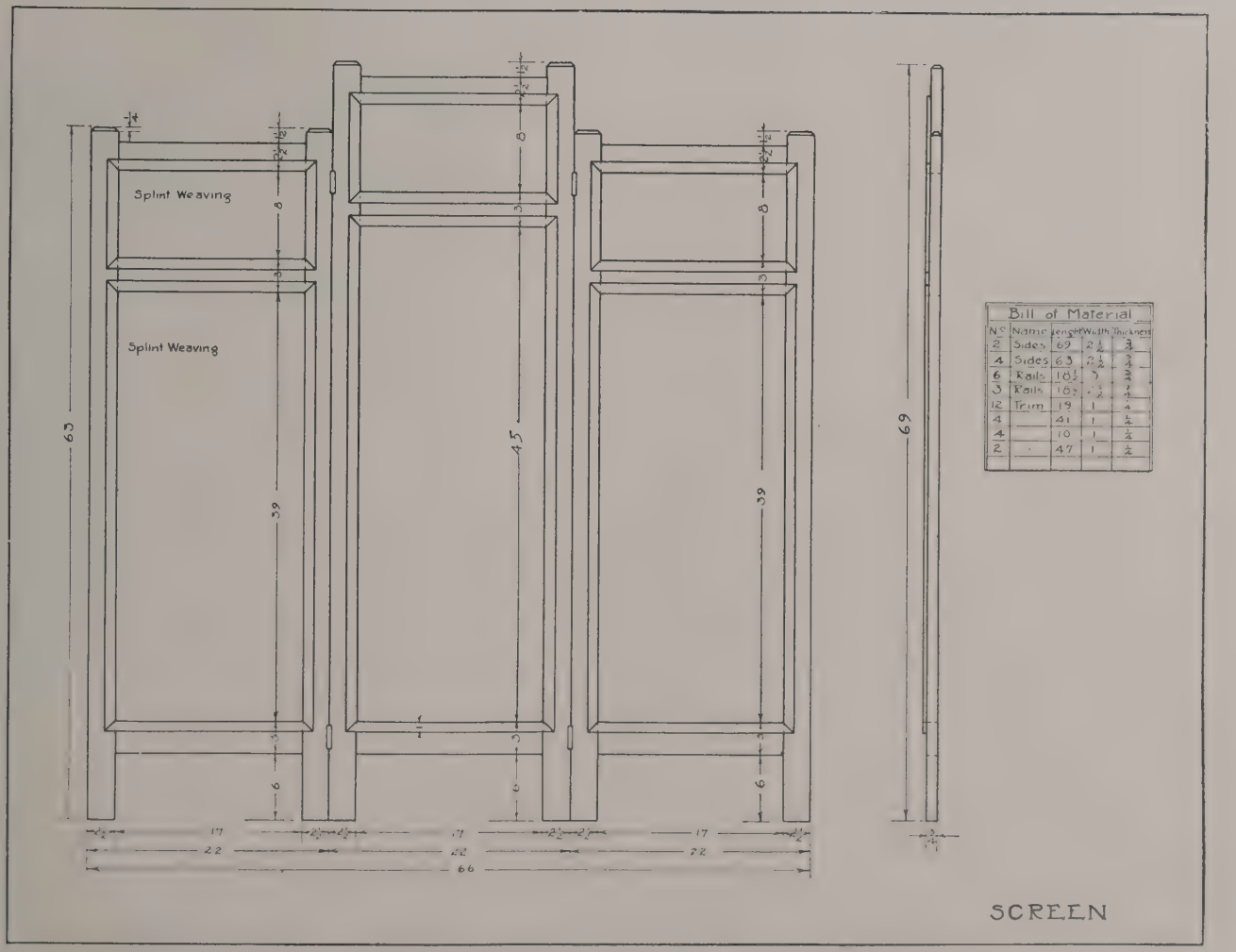


Fig. 88—Working Drawing of Screen (Eighth Grade)

The weaving is done on the drawing board and is then transferred to the basket.

This method of weaving panels is pursued in weaving for small openings.

Fig. 92 shows a finished fireplace basket. The working drawing, Fig. 93, shows the simplicity of its construction. The handle may be made of any wood that can be made to bend after soaking in warm water.

Fig. 94 shows a finished tabouret made with the top hinged, thus making it possible for any housekeeper to store away a number of articles. This double use is quite worth considering, especially to those living in small flats.

Fig. 95 shows the working drawing for the tabouret.

The stool shown in Fig. 96 is a little more difficult in construction.

Fig. 97 is the working drawing for the stool. The top of the stool is woven by tacking the strips along the inner edge of one end of the frame. When the weaving is completed, the opposite ends and sides are tacked to the inner edges of the frame. This frame just fits the stool by cutting the corners, as shown in Fig. 97.

The flower box shown in Fig. 98 makes a most attractive problem for the pupils of the eighth grade.

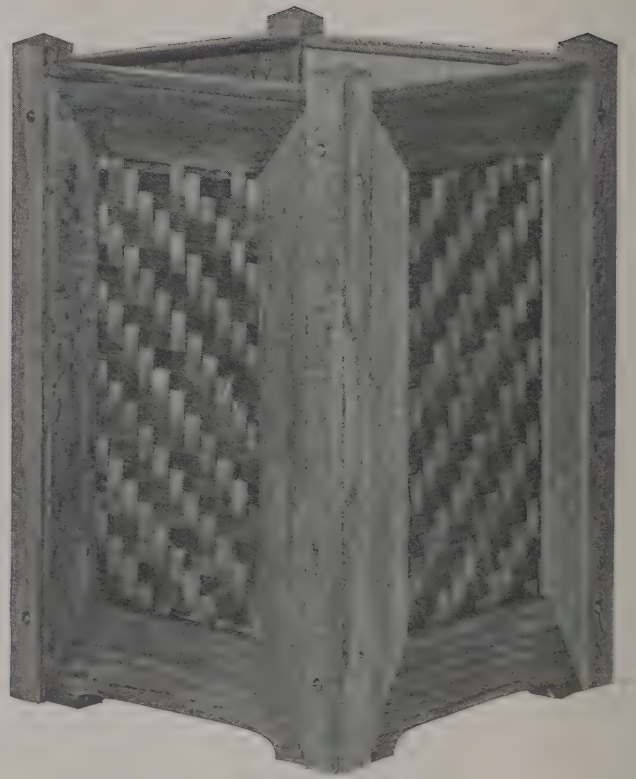
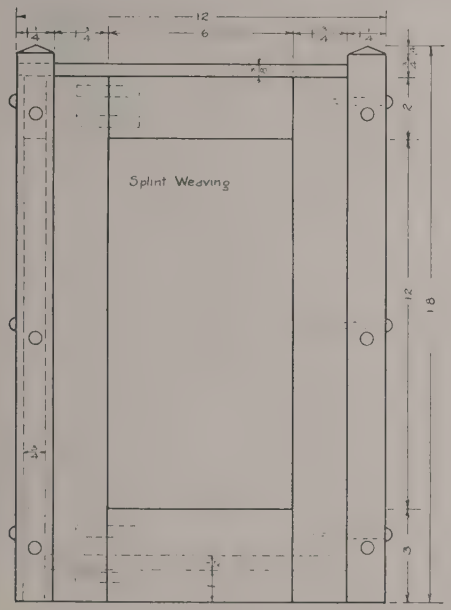
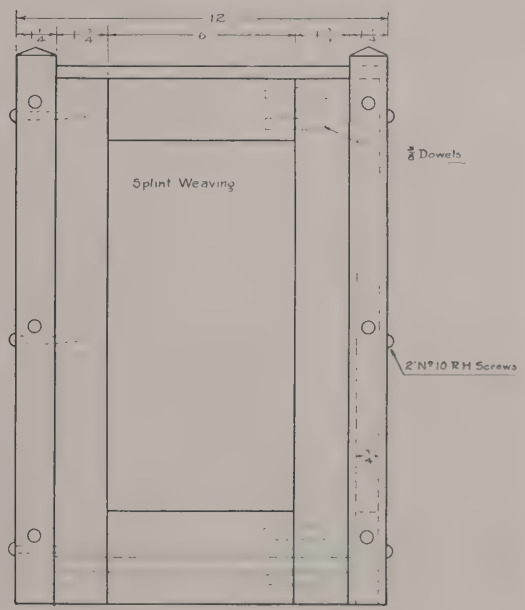


Fig. 90—Waste Basket

The panels for this may be woven as suggested in the case of the tabouret and waste basket.

Fig. 99 shows the working drawing for a plant box. A metal box is placed on the inside to prevent water from dripping.





Bill of Material

N°	Name	Length	Width	Thickness
4	Posts	18	1¼	1¼
8	Sides	17	1¾	¾
4	Rails	6	2	¾
4	Rails	6	3	¾
1	Bottom	10	10	½
32	Dowels	2	⅜	Diam
24	R.H. Screws	2	N°	2
4	Trim	9½	1	¾

WASTE BASKET

Fig. 91—Working Drawing of Waste Basket (Seventh Grade)

Fig. 92—Fireplace Basket

Fig. 94—Tabouret

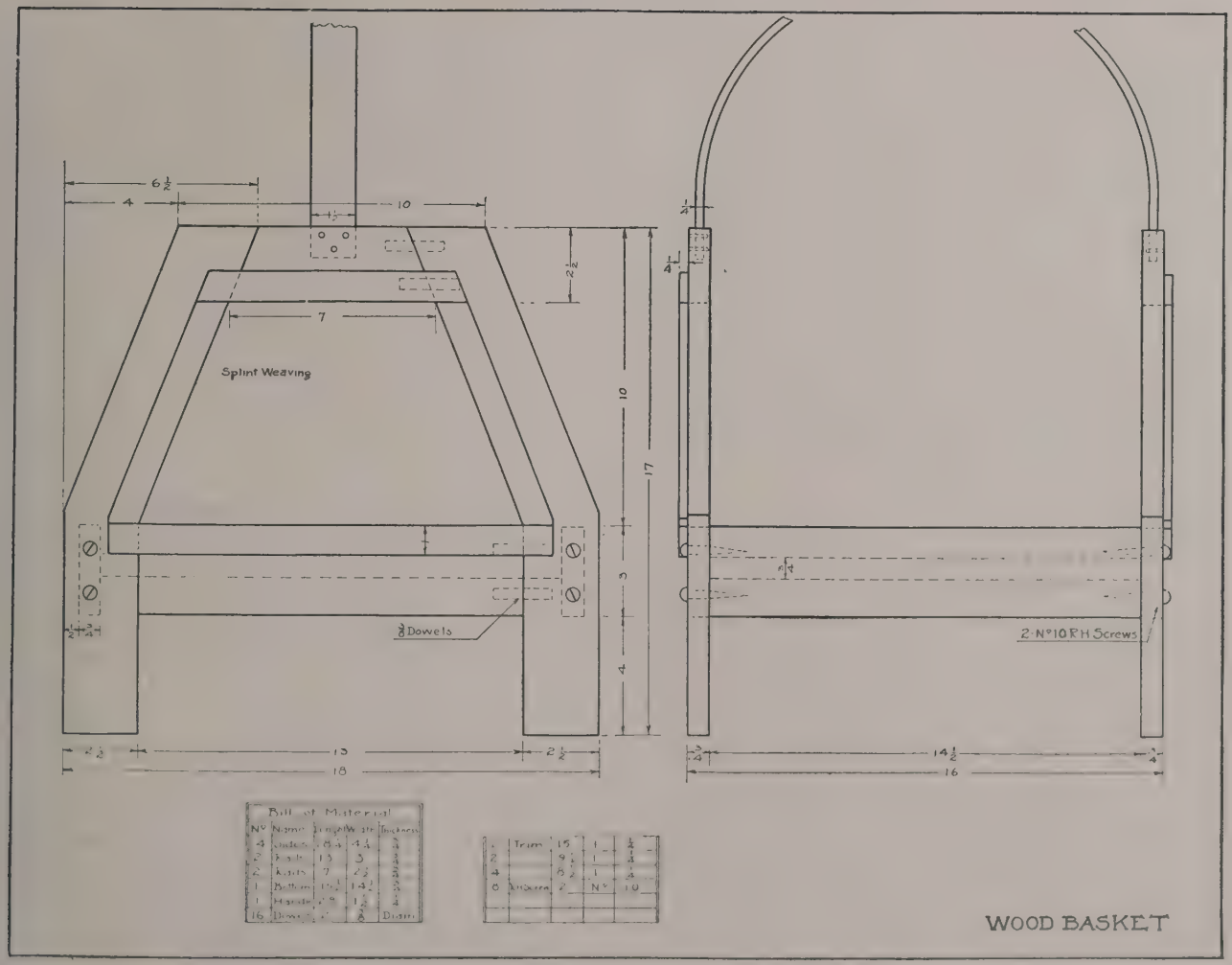
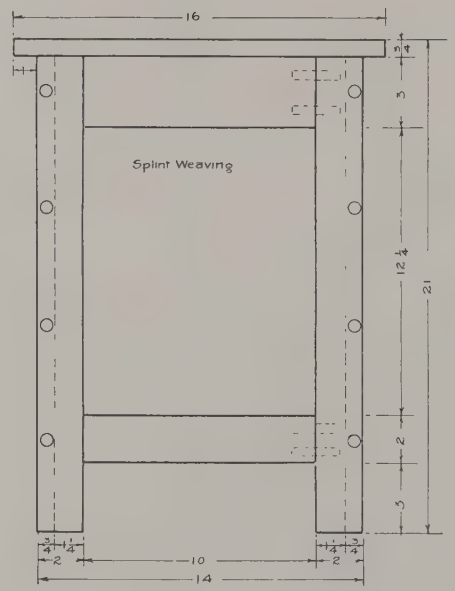
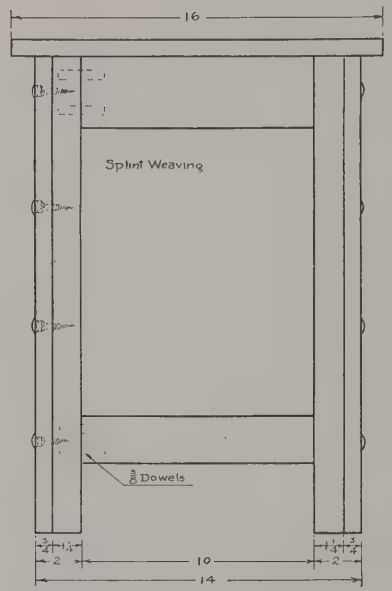


Fig. 93—Working Drawing of Wood Basket (Eighth Grade)





Bill of Material				
Nº	Name	Length	Width	Thickness
4	Sides	20½	2	¾
4	Sides	20½	1¼	¾
4	Rails	10	3	¾
4	Rails	10	2	¾
1	Top	16	16	¾
32	Dowels	2	⅜	Diam

TABOURET

Fig. 95—Working Drawing of Tabouret (Eighth Grade)

Fig. 100 shows a most interesting tea table which may be folded and placed in a remarkably small space, as shown in Fig. 101. The trays are woven of ash splint.

To make the trays, the weaving is first done in the form of a square. A circular frame is made of the heaviest ash splints, and may be composed of several thicknesses. The frame is now placed on the square weaving, and a line drawn just outside it. When cutting the weaving circular, cut about 1 in. outside the mark. The ends are now turned upward next to the outside of the circular tray, and are held in place by using the 1 oz. iron tacks. Another frame is now made to fit outside the first one. When this is slipped in place, the tacking is brought between the two frames.

To make the tray more secure, a $\frac{1}{8}$ in. strip of ash may be used to overcast the top, similar to overcasting done in basketry.

Fig. 102 shows the working drawing for the standard of the tea table.

Fig. 103 shows a finished tea table. The woven panel at each end adds greatly to the appearance of the finished product.

Fig. 104 shows the working drawing of the tea table.

Fig. 96—Foot Stool

Fig. 105 shows a simple, yet effective, magazine rack. It is somewhat different from the stereotyped forms. It is a beginning toward getting away from the old types that are so apt to suggest fences or chicken coops.

Fig. 106 shows the working drawing for the magazine rack.

Fig. 107 shows a most attractive way in which the ash splint may be used in the construction of a sewing basket.

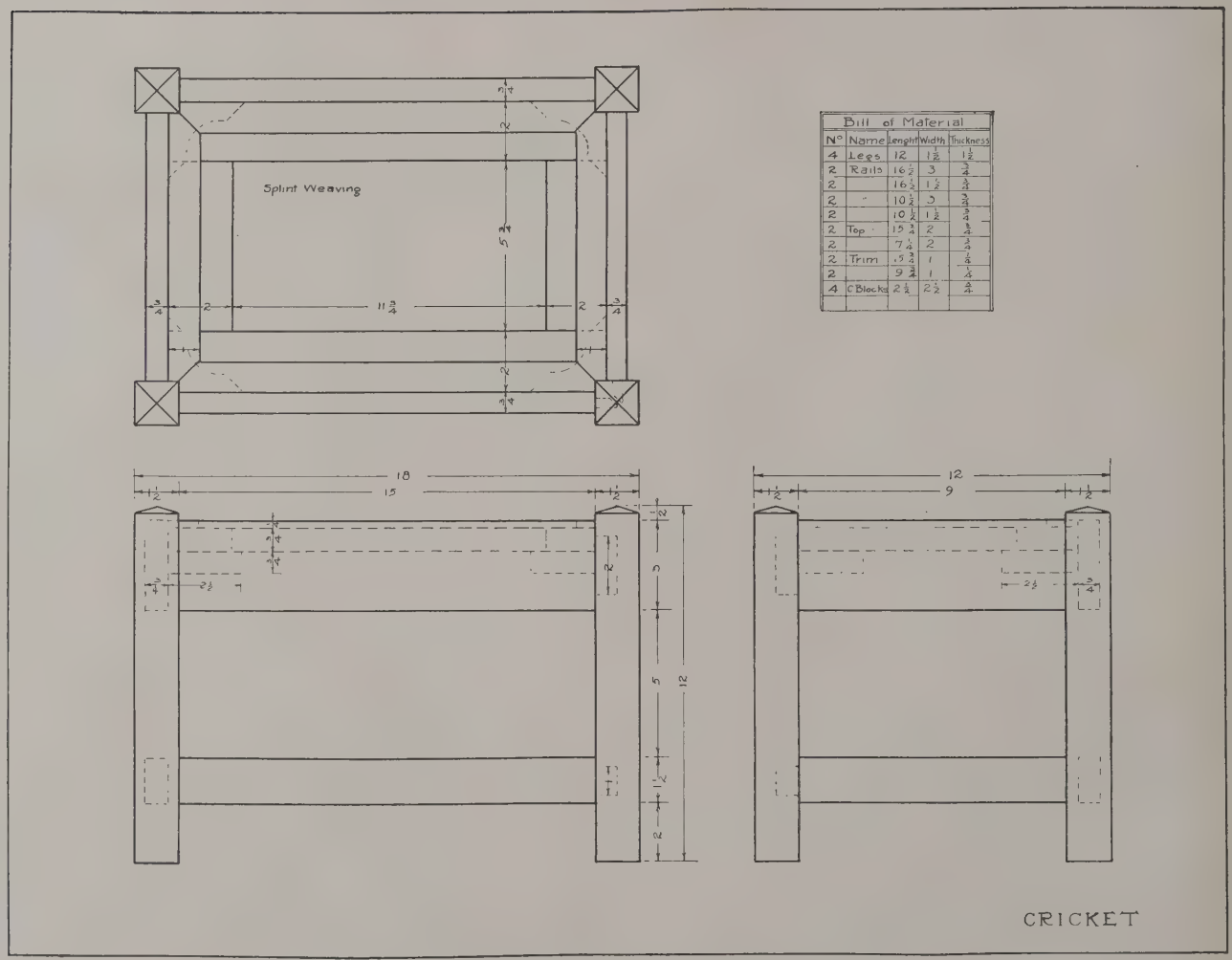
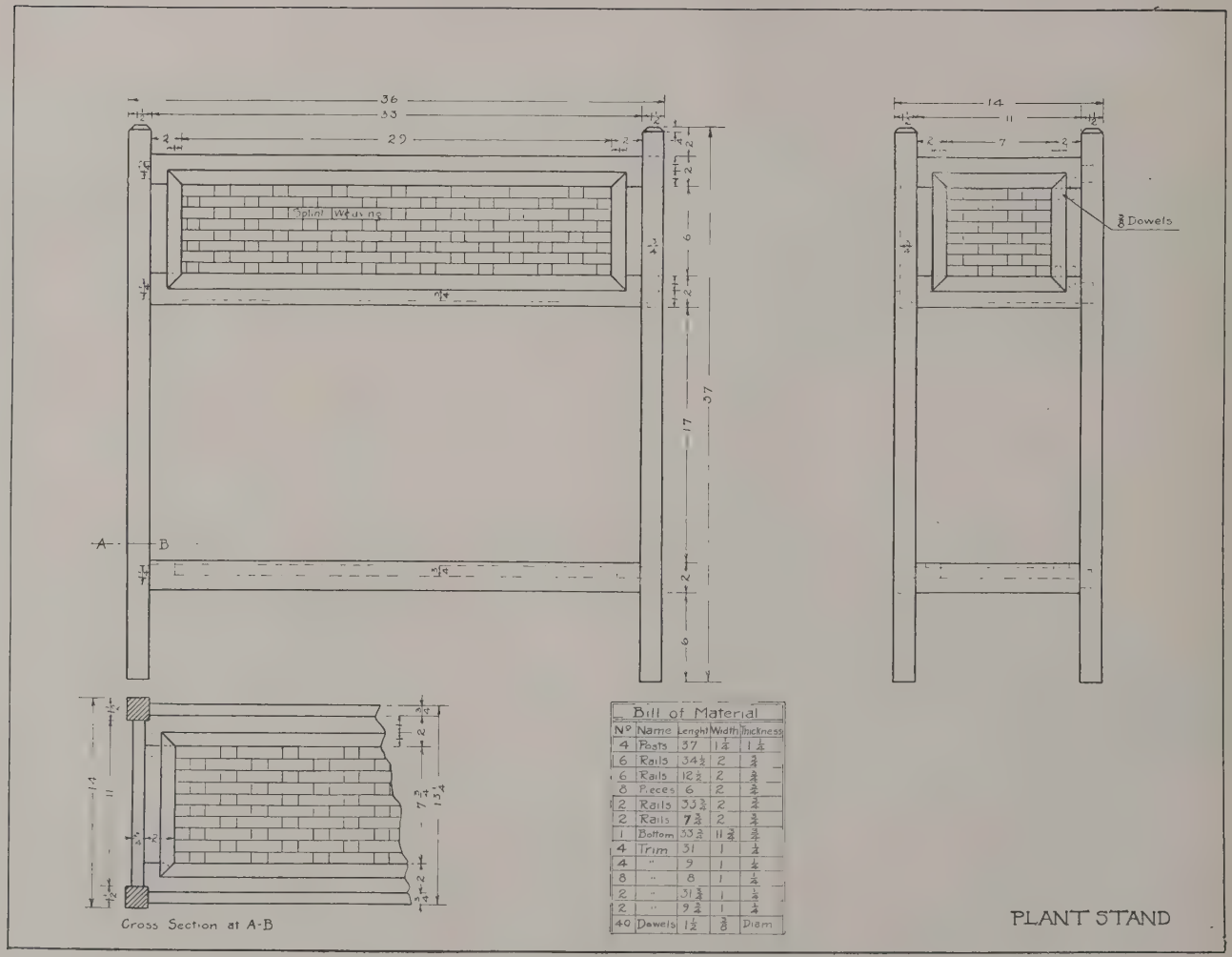


Fig. 97—Working Drawing of Foot Stool (Eighth Grade)

Fig. 98—Plant Stand

Fig. 100—Tea Table



Bill of Material				
Nº	Name	Lenght	Width	Thickness
4	Posts	37	$1\frac{1}{4}$	$1\frac{1}{4}$
6	Rails	$34\frac{1}{2}$	2	$\frac{3}{4}$
6	Rails	$12\frac{1}{2}$	2	$\frac{3}{4}$
8	Pieces	6	2	$\frac{3}{4}$
2	Rails	$33\frac{3}{8}$	2	$\frac{3}{4}$
2	Rails	$7\frac{3}{8}$	2	$\frac{3}{4}$
1	Bottom	$33\frac{3}{8}$	$11\frac{3}{8}$	$\frac{3}{4}$
4	Trim	31	1	$\frac{1}{4}$
4	"	9	1	$\frac{1}{4}$
8	"	8	1	$\frac{1}{4}$
2	"	$31\frac{3}{8}$	1	$\frac{1}{4}$
2	"	$9\frac{3}{8}$	1	$\frac{1}{4}$
40	Dowels	$1\frac{1}{2}$	$\frac{3}{8}$	Diam

Fig. 99—Working Drawing of Plant Stand (Eighth Grade)

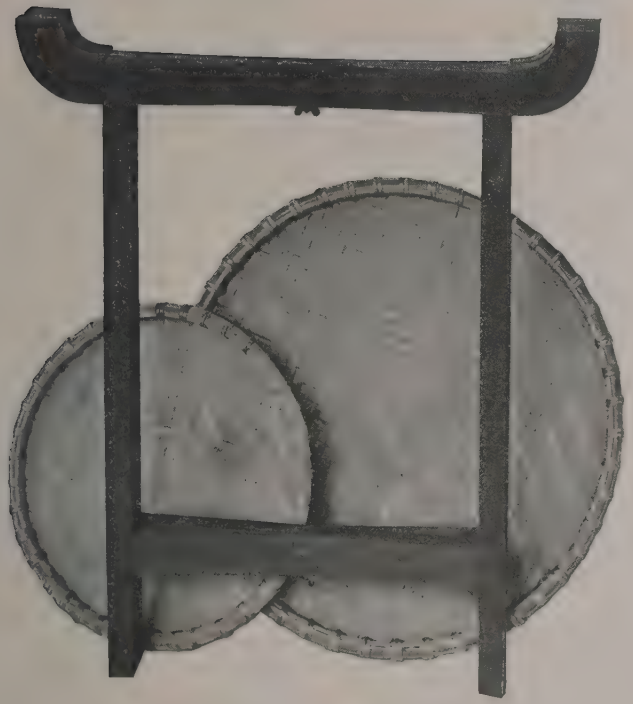


Fig. 101—Tea Table Folded

Fig. 108 shows the working drawing for the sewing basket.

Fig. 109 shows a completed lamp in which a panel of ash splint is woven in each side. This problem is the most difficult of any suggested, and should not be undertaken as a class exercise, but rather by the exceptional boy.

Fig. 110 shows the working drawing of the lamp standard, and Fig. 111 shows the working drawing of the shade.

Fig. 112 gives the working drawing of a newspaper tray. If the dimensions given do not suit the size of the folded paper for which the basket is to be constructed, they may be changed to meet requirements.

Fig. 103—Tea Table

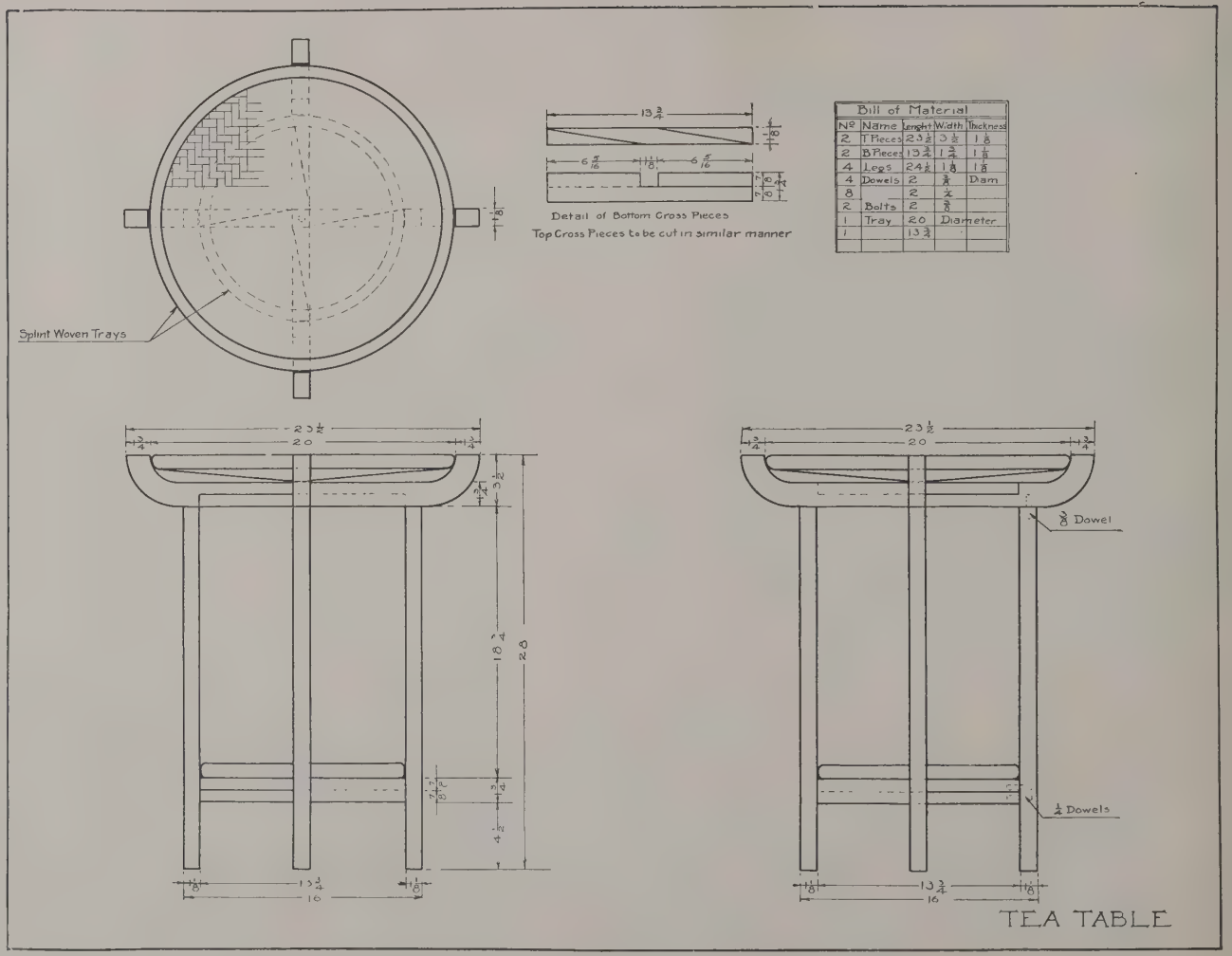


Fig. 102—Working Drawing of Tea Table (Eighth Grade)

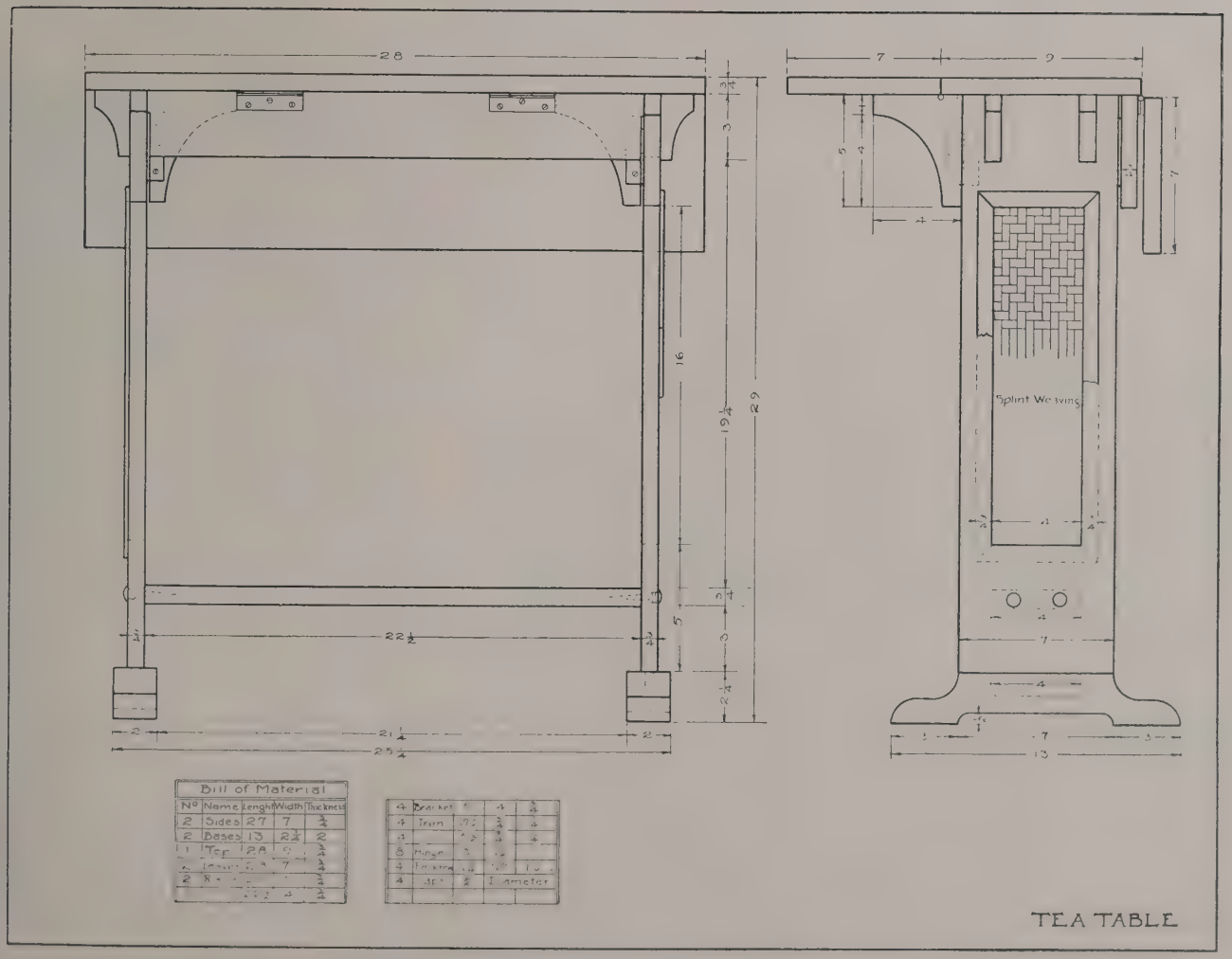


Fig. 104—Working Drawing of Tea Table (Eighth Grade)

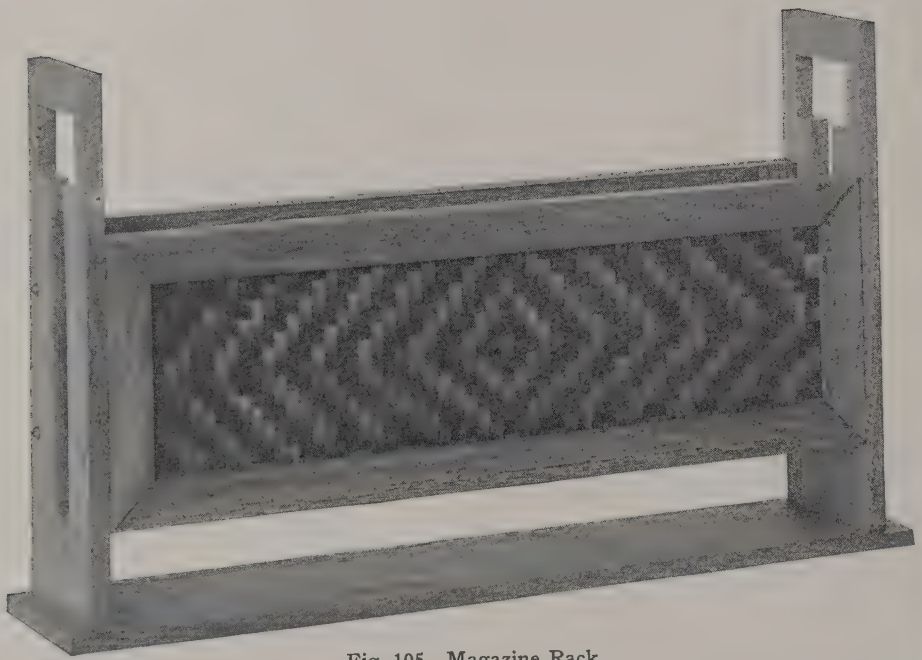


Fig. 105—Magazine Rack

Fig. 107—Sewing Basket

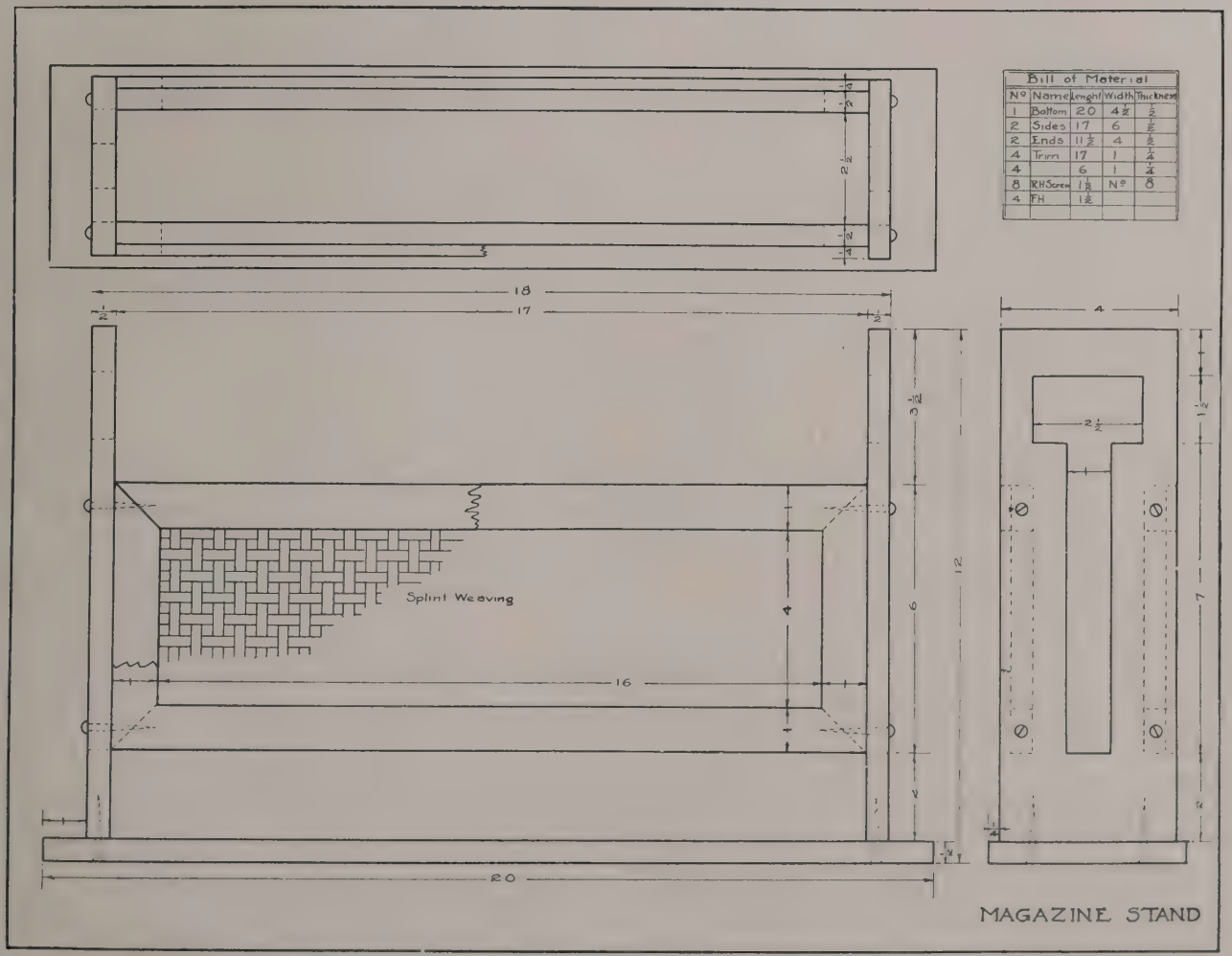


Fig. 106—Working Drawing of Magazine Stand (Seventh Grade)

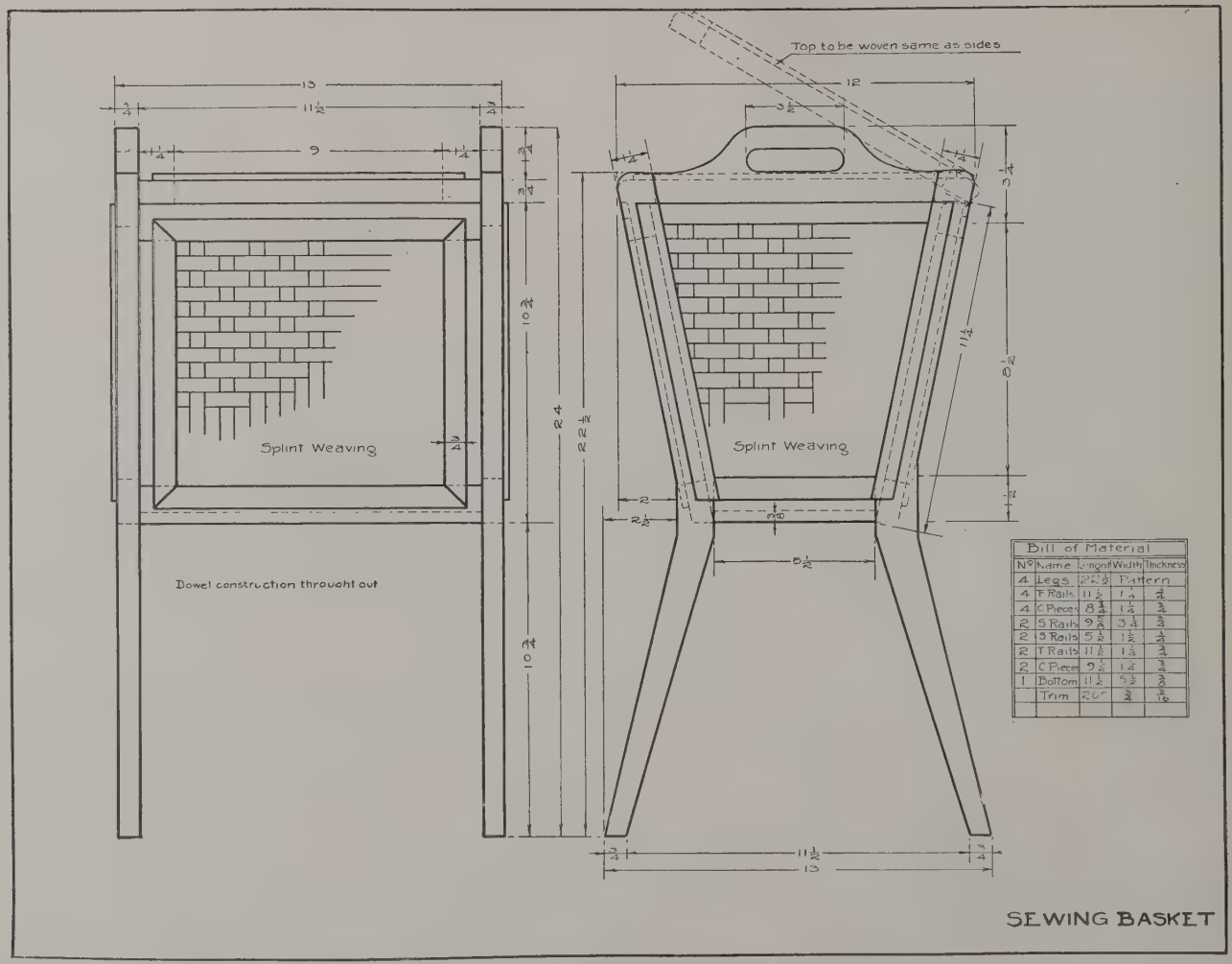


Fig. 108—Working Drawing of Sewing Basket (Eighth Grade)

Fig. 113 shows the finished basket.

Fig. 114 shows the working drawing for a telephone directory rack. The cover of a directory is usually poor in color and design. It is therefore desirable to keep as much of it as possible out of sight.

Fig. 115 shows the finished rack.

The ash splint cannot be used in the seating of large chairs, nor in any other large piece of furniture where strength is required, without being reinforced by a flat wire. This wire is woven at the same time the splint weaving is done.

Splints of ash, oak and hickory must, at least for a time, be used in place of the pith cane (flat reed).

Attention is called at this point to the fact that an effort has been made to keep the problems as simple as possible. It is hoped that they are within the power of the seventh- and eighth-grade pupils to construct, thus making the suggestions practical.

Fig. 109—Table Lamp

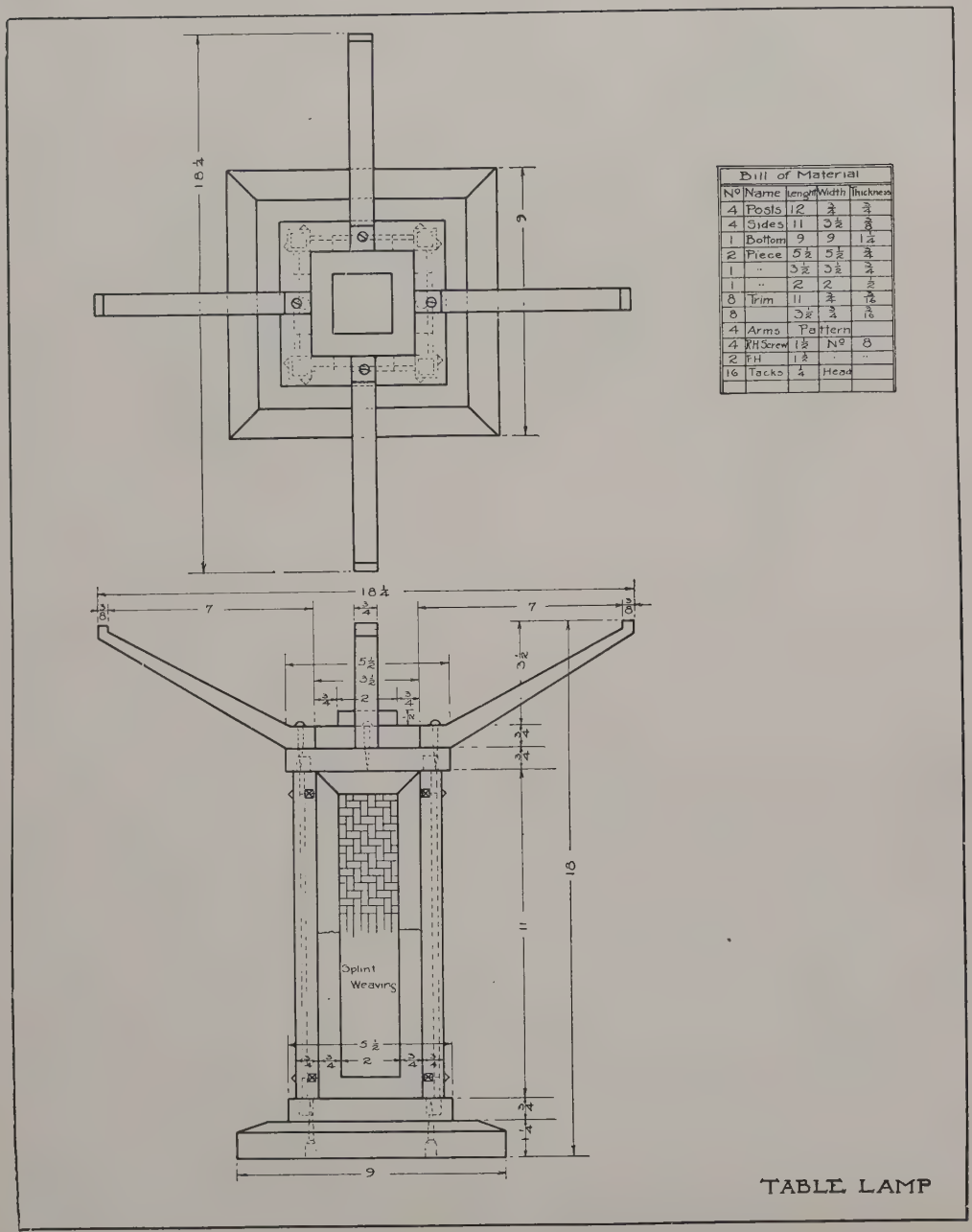


Fig. 110—Working Drawing of Table Lamp (Eighth Grade)

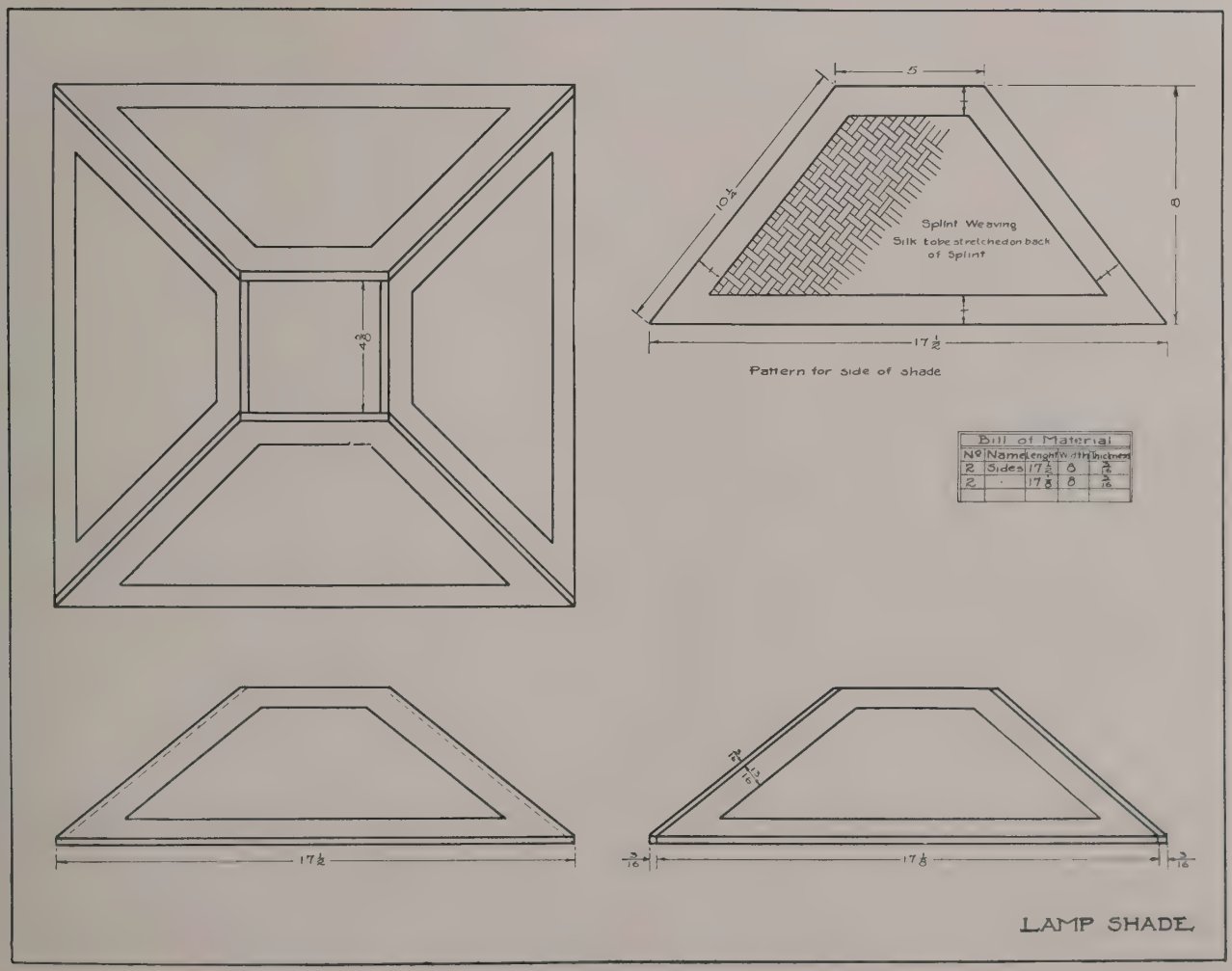


Fig. 111—Working Drawing of Lamp Shade (Eighth Grade)

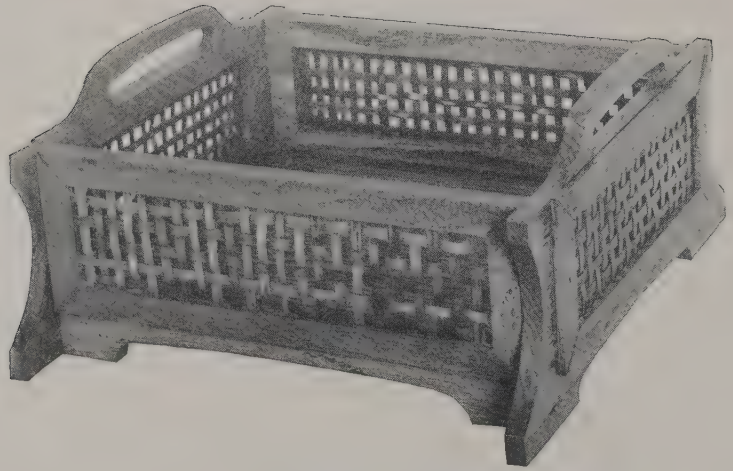


Fig. 113—Newspaper Tray

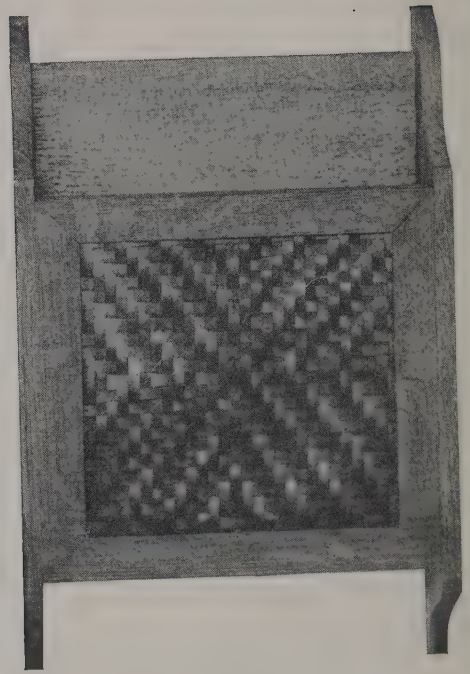


Fig. 115—Directory Rack

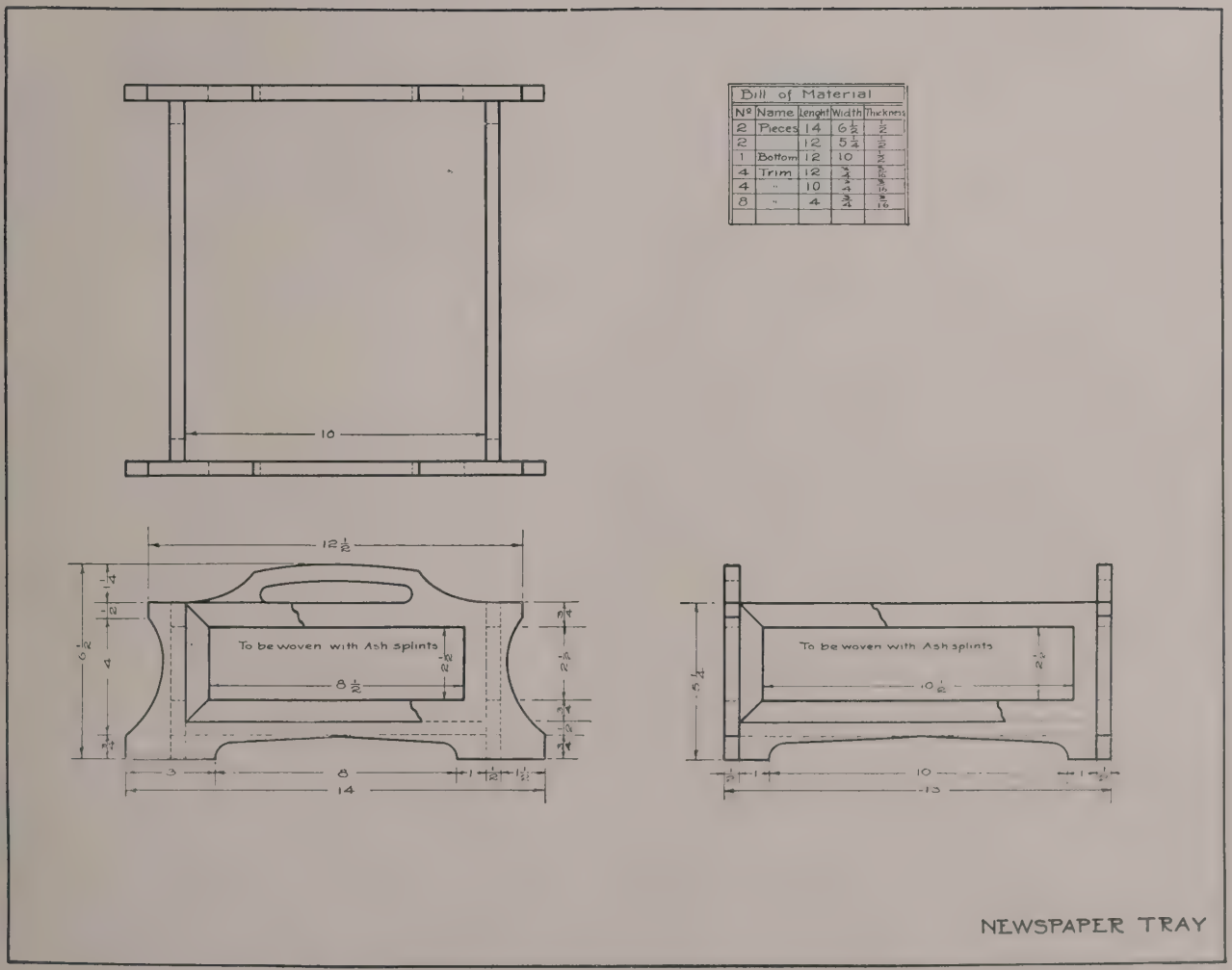
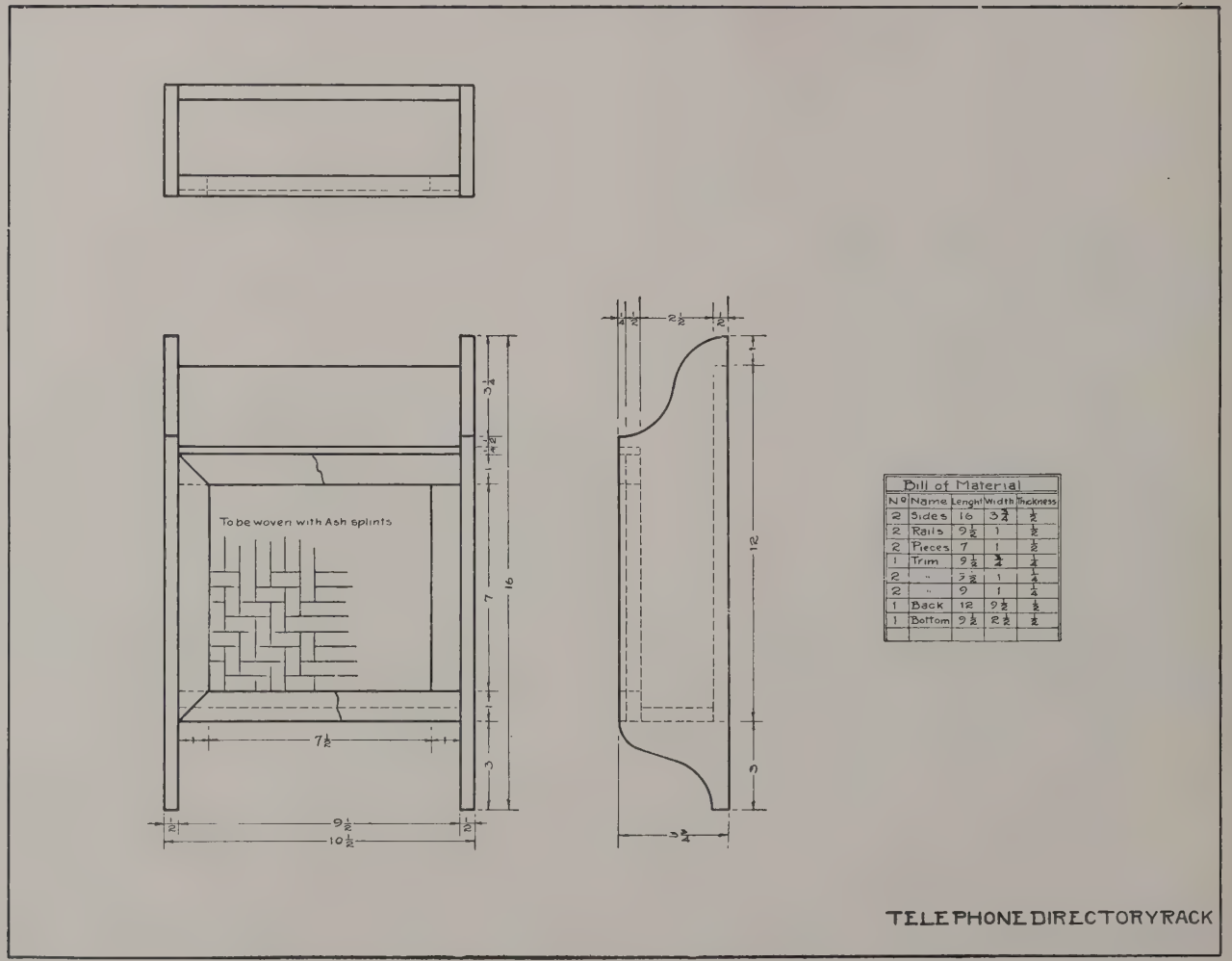


Fig. 112—Working Drawing of Newspaper Tray (Seventh Grade)



Bill of Material

No	Name	Lenght	Width	Thickness
2	Sides	16	3¾	½
2	Rails	9½	1	½
2	Pieces	7	1	½
1	Trim	9½	½	¼
2	"	3¾	1	¼
2	"	9	1	¼
1	Back	12	9½	½
1	Bottom	9½	2½	½

Fig. 114—Working Drawing of Telephone Directory Rack (Seventh Grade)

CHAPTER V

Cane Weaving

There is no material which works more harmoniously and artistically in combination with wood than the old-fashioned cane that was used in much of our grandmothers' furniture.

Like many of the old arts, cane weaving is being gradually revived, not just as it was half a century ago, but in such a way as to fill the needs and demands of the present modes of living.

In the past, caning was used principally in the seats and backs of chairs; while now, it is used not only in this way, but many surfaces are broken in a most pleasing way by panels or friezes of cane.

We enjoy and appreciate our surroundings only so far as we have been taught to see what is about us. It is after our attention has been called to certain combination of materials that we begin to realize their importance in the artistic and commercial world.

Caning has a legitimate place in the manual training of our elementary schools. It is a very wholesome occupation, and when used in conjunction with wood, adds greatly to the interest of the pupils in their manual training projects. It is a line of work that develops the mind, the hand, and the eye. Any seventh-grade boy can do this work. Much of the work suggested in the following exercises may be pursued in the home, thus caring for many of the boy's leisure hours by furnishing him interesting occupation. This occupation may be carried over to the repairing of many worn-out jobs in caning for the neighbors, thus giving the boy an opportunity to place a money value on his work.

That the work is so limited in our school shops is often due to the fact that our teachers are unfamiliar with it. Many may feel that caning is not a part of manual training, and thus has no place in such a course. The manual training teacher must take the broadest possible view of the work in his charge. He should become familiar with the various materials which will work in combination with wood. He should understand the handling of such materials and the processes necessary to produce the finished product. There is no doubt but the introduction of cane, splint, reed, etc., in conjunction with wood, often makes a real, live problem of the one at hand, which otherwise would be dead, or at least uninteresting.

To appreciate the commercial value of the combination problem, one needs only to consult a salesman in one of the large department stores, or some dealer in furniture.

Manual training in the grade is not designed to make carpenters, cabinet-makers and pattern-makers of our boys, any more than it is to make surgeons of them. For this reason, the greater variety of materials which can be introduced into the work, the more mental power and skill it takes in its manipulation.

When introducing a new material, it is always well to have the members of the class know something of its origin, what it is, where it comes from, how prepared for the market, etc. It thus becomes a real, live problem in commercial geography.

Cane is a product of India, China, Ceylon, and many islands in the Indian Archipelago. It is the outer covering of a kind of palm known as rattan. It grows to an immense height, often reaching the tops of the tallest trees. It is often found trailing on the ground to a length of several hundred feet, not exceeding a diameter of more than 1 in. For convenience in handling, it is cut into lengths of from twelve to twenty feet.

Great quantities of this material are shipped to various European countries, where it is prepared for market, to be sent to all parts of the world. It is the outer covering of the stem which makes the cane. It is stripped off in widths of from 1/16 in. to 3/16 in., and tied up in bundles of about 1,000 feet each. The commercial name for such a bundle is "hank." It sells for from 55 cents to 95 cents per hank. The inner part of the stem is cut by running it through circular dies of various sizes, thus giving to us the assorted sizes of reed such as are used in basketry. The flat reed, properly called "pith cane," is nothing more than the inner part of the stem cut into thin flat strands.

In market terms, cane is designated as superfine, fine-fine, fine, medium, common, narrow binder, and wide binder. Fine and medium are the best suited for pupils' work. There is no difficulty in determining the right side of cane, as it has a very glossy surface.

The equipment necessary to carry on the work is exceedingly simple, consisting of the following: A scratch awl, a knife, or pair of scissors, a pair of dividers, a rule and four or five pegs made of ¼ in. dowel rod pointed as shown in the illustration, a caning needle, constructed as shown in Fig. 116. The cost of such a needle, if made by a workman,

is about 35 cents. Its direct use will be mentioned later.

As the needles are not on the market, it is necessary for some local workman, or the pupil himself, to construct them. They are made of a piece of round steel wire about 18 in. long, flattened at one end. An eye is cut in the flattened portion, and the blunt point is curved, as shown in Fig. 116. The other end is run through an ordinary tool handle and riveted.

The needle is a great assistance in executing the fourth step in caning. The needle, however, is not absolutely necessary, as the work may be done without it, taking a somewhat longer time. Reference will be made again to this point when taking up the various steps.

Making a Fernery

There is no reason why our pupils should not learn cane weaving through the construction of some interesting manual training exercises. The day of doing things just for the sake of learning the processes, has practically passed. Fig. 117 shows the working drawing of an interesting fernery for a dining-room table. It is very simple in its construction, and not in the least beyond the ability of the average seventh-grade pupil. The exercise involves the butt joint. The inner part of each side is sawed out, leaving the opening to be caned. This kind of

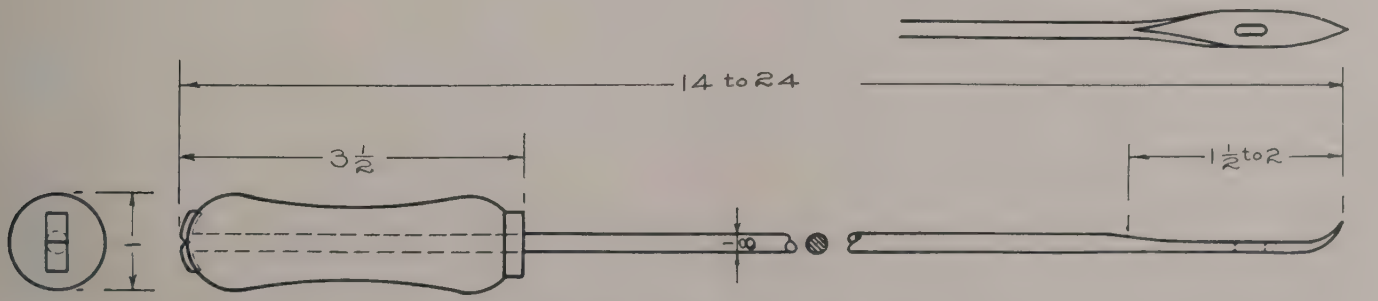


Fig. 116—Working Drawing of Caning Needle

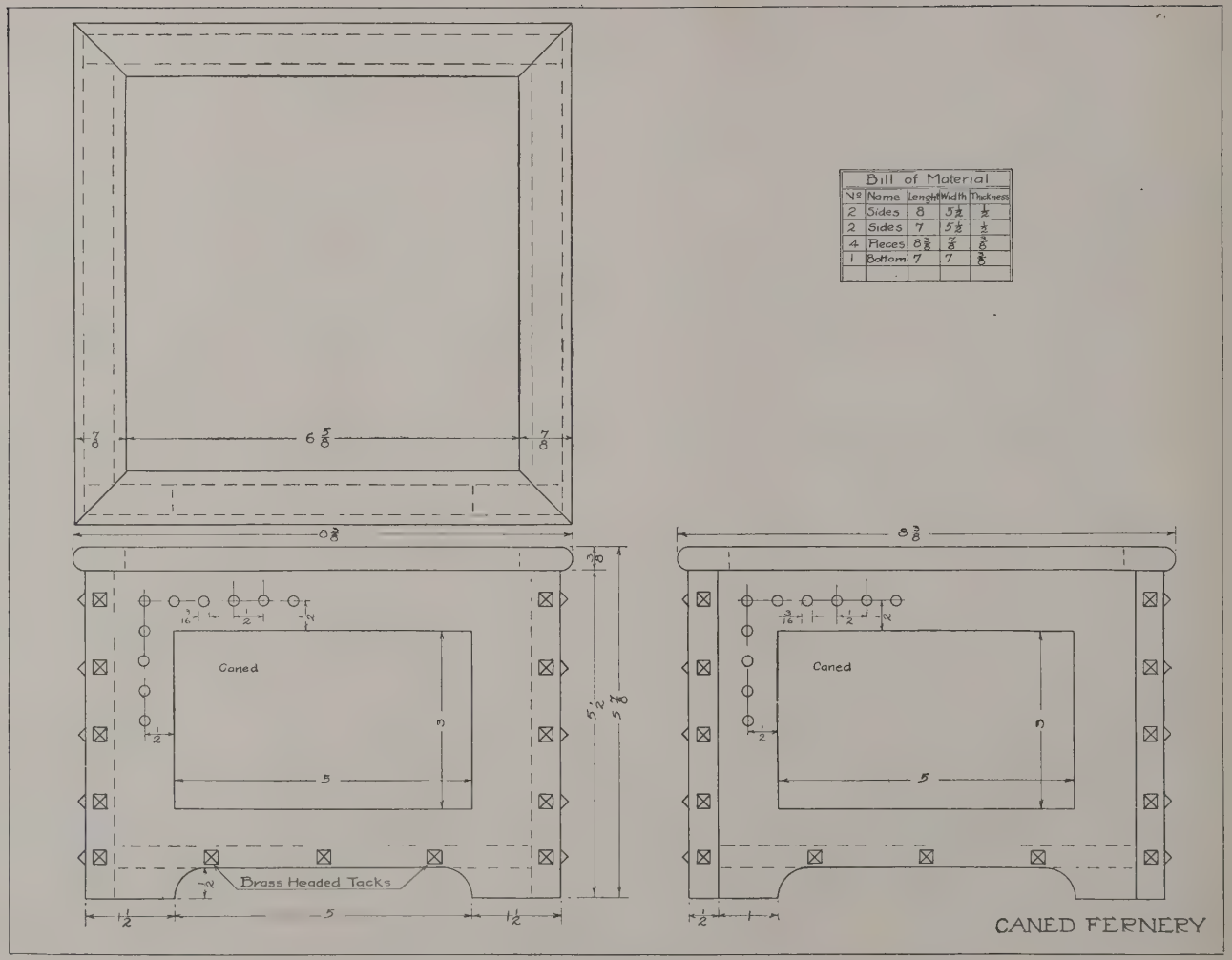


Fig. 117—Working Drawing of Caned Fernery (Seventh Grade)

construction is legitimate, where the caned parts are not to be put under any great strain. It would hardly do to construct the seat of a chair in this way.

Steps in Caning

Fig. 117 shows the entire working drawing, and Fig. 118 shows one corner of the opening to be caned. Draw a pencil line around the entire opening, ½ in. from the edges. It will be observed that this distance from the edge is allowed in most all commercial work for various widths of cane. With a pair of dividers, mark off ½ in. spaces on the line just drawn by beginning at the upper right-hand corner where the lines intersect, and proceed to the left. In marking the opposite rail, use the try-square or framing square, as this will bring the holes, when bored with a 3/16 in. wood bit, directly opposite each other. Fig. 118 shows all necessary details. When the boring is completed, the frames are ready for the cane. For convenience, the several steps in caning will be numbered as follows:

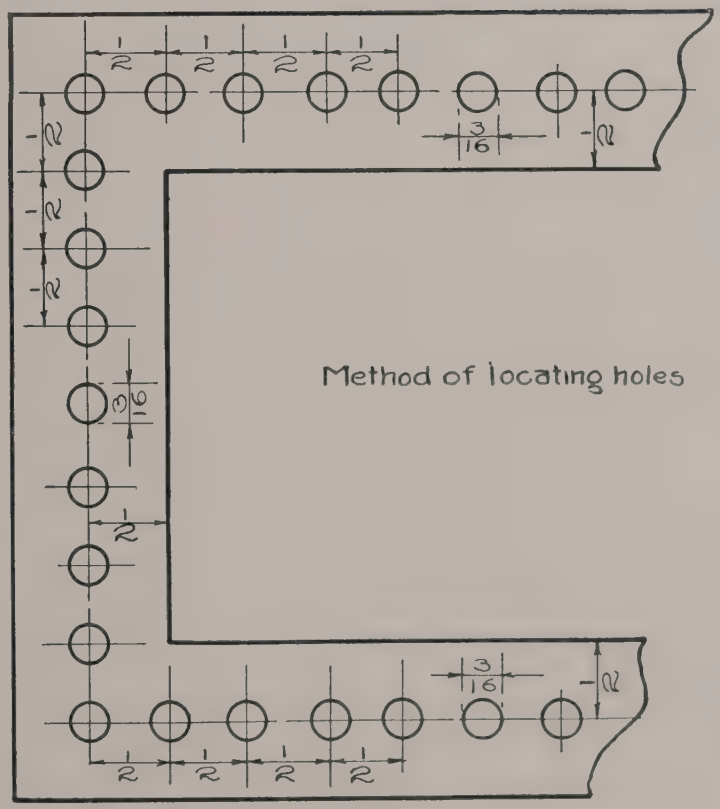


Fig. 118—Method of Locating Holes

First Step: Fig. 119 shows the first step in cane weaving. Moisten a hank of cane in either warm or cold water. It is not necessary to allow it to soak more than two or three minutes, as the water remaining on the cane is absorbed, making it very pliable. Start a strand right side up by drawing one end through the hole marked 1, as shown in Fig. 119. Hold this end in place by forcing a peg

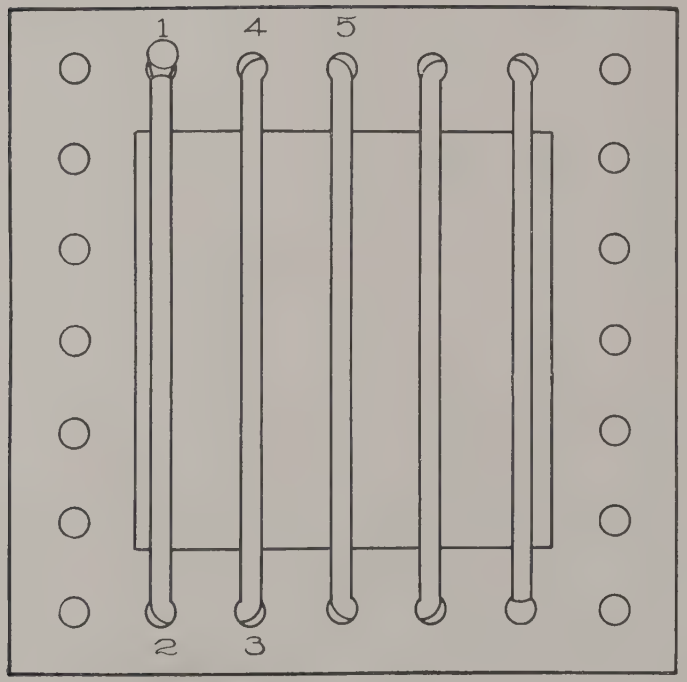


Fig. 119—First Step in Caning

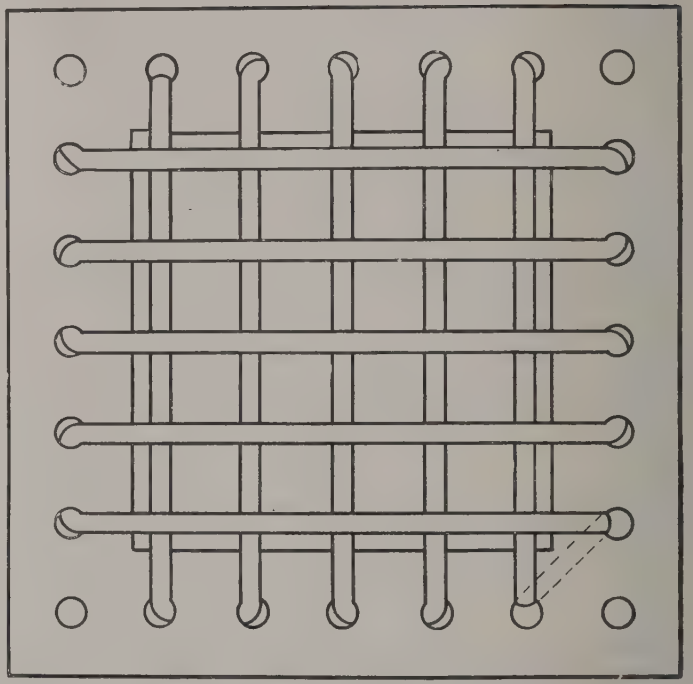


Fig. 120—Second Step in Caning

into the hole. Draw the other end of the strand through the opposite hole marked 2, always keeping the right side up. This is most easily done by drawing the strand between the thumb and forefinger. This not only keeps the right side up, but prevents twisting and kinks. Another peg may now be inserted in hole 2. See that the cane is fairly tight. The end is next brought up through hole 3, care being taken that the right side of the cane is always kept to the outside. To do this, the cane must be drawn between the thumb and forefinger each time. The end is now carried across the opening and down

hole 4. The peg is now removed from hole 2 and placed in No. 4. The end is next brought up hole 5, and the peg taken from hole 3 and placed in No. 5. Continue in this way until all the holes in the parallel rails have been used, as shown in Fig. 119.

Second Step: There is no difference between the first and second steps, except that the holes in the other parallel rails are used, and the cane is carried over the first. If there is any part of the first strand left, do not cut it, but carry the end over to the first hole in the vertical rail, and proceed as in the first step. Fig. 120 shows the second step completed. Move the pegs as the strand travels from one hole to the other.

To fasten the end, draw it under the nearest stitch on the under side of the frame, as shown in Fig. 121. The new end may be fastened in the same way as the end of the used one.

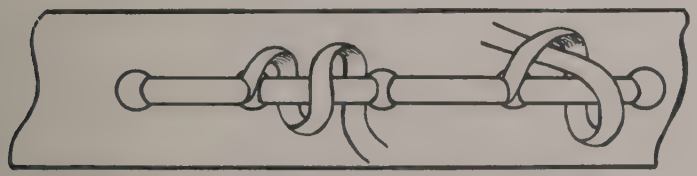


Fig. 121—Methods of Tying Cane Ends

Sketch of Peg

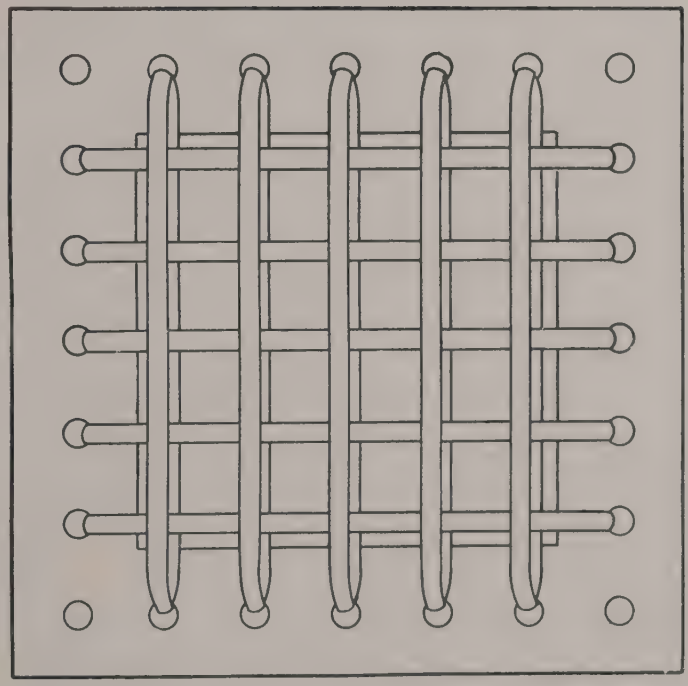


Fig. 122—Third Step in Caning

Third Step: This step is identical with the first. It runs over the first and second, and is parallel with the first. It will be observed by this time that the same hole is used a number of times. It often be-

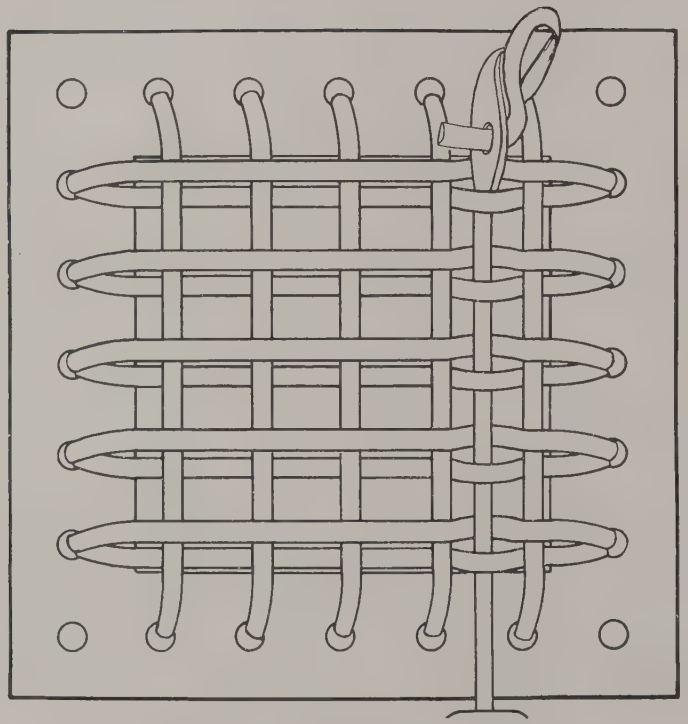


Fig. 123—Using Needle, Fourth Step

comes necessary to use the scratch awl in forcing an opening to allow the cane to pass through the hole.

Fig. 122 shows the third step completed.

Fourth Step: The weaving, properly so called, begins at this particular stage of the work. It is in this step that the needle is used. It will be observed that some holes have been used twice, and some once. Start a hole next to a corner that has been used but **once,** and on the side toward the open space to be caned. With the needle, begin to weave over and under, across the entire opening, as shown in Fig. 123. The end of the cane is now run through the eye of the needle and drawn through, being careful to avoid kinks or twists. Draw the end through the hole, bringing it up through the next hole. The needle is now woven across from the opposite direction and the cane is drawn through. This is continued until the entire surface is completed. When finished, it appears somewhat confusing, as shown in Fig. 124. This is all adjusted by moistening the cane with a sponge or cloth, and pushing the parts forming pairs together. It will be observed that the cane forms itself into groups. The strands from right to left form groups, and those from front to back form groups. Fig. 125 shows the fourth step completed.

The fourth step may be accomplished without the needle by bringing the end of the cane over and under, following the same course as described for the needle.

For convenience, the work should always be clamped to some substantial support,—the work

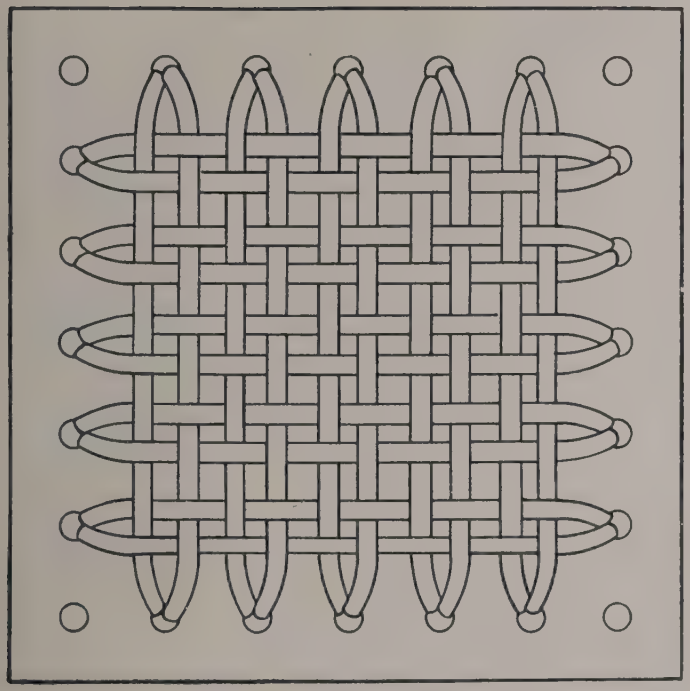


Fig. 124—Fourth Step After Being Woven

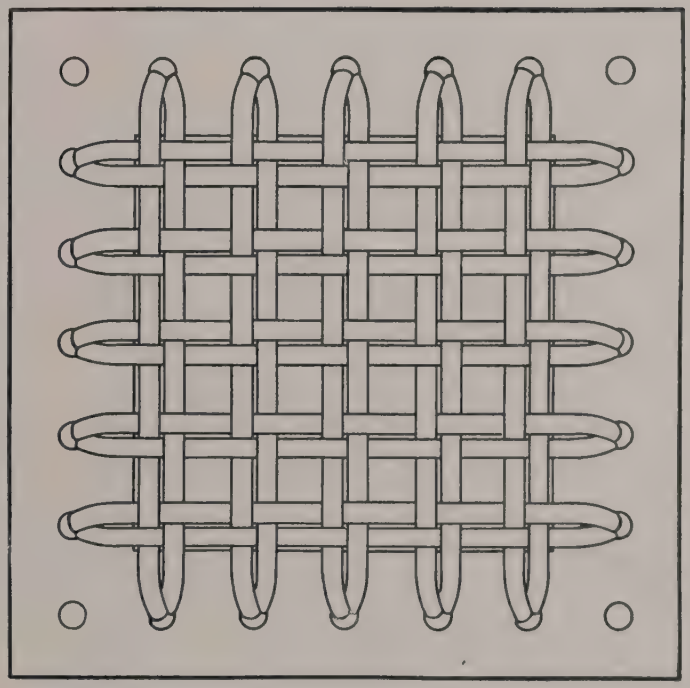


Fig. 125—Fourth Step Completed

bench, a table, or the pupil's desk, as shown in Fig. 126.

Fifth Step: This step begins with the first diagonal weaving. For convenience, start a strand at the upper right-hand corner. With one hand under, and the other over the frame, guide the end so it passes under the first vertical group and then over the first horizontal group, as shown in Fig. 127.

Since the end passes over the first vertical group, it must pass over each group parallel to the first;

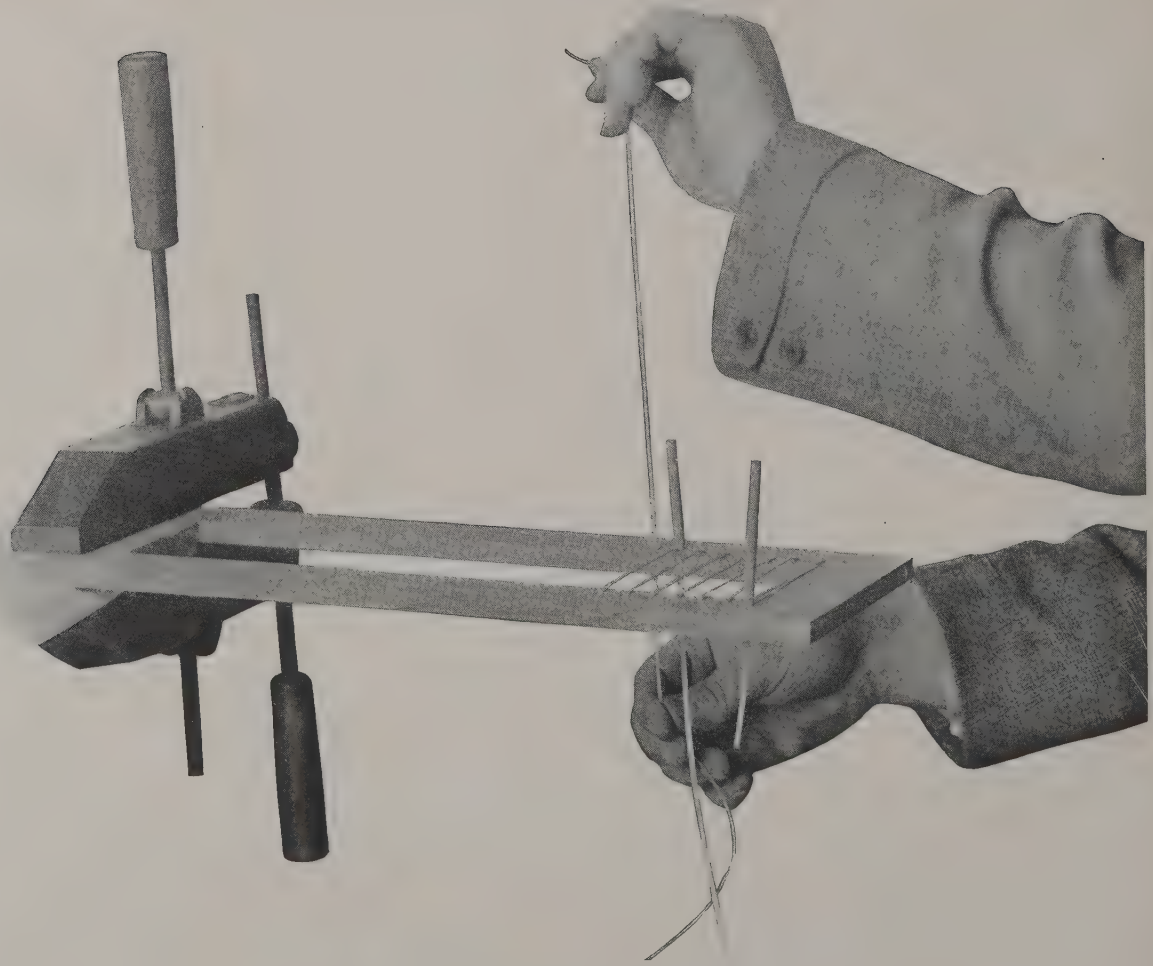


Fig. 126—Work Clamped to Table

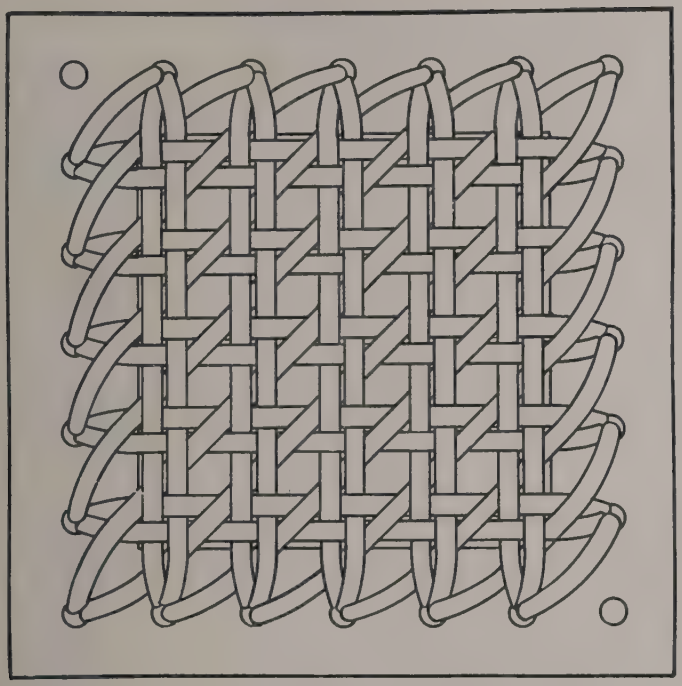


Fig. 127—Fifth Step in Caning

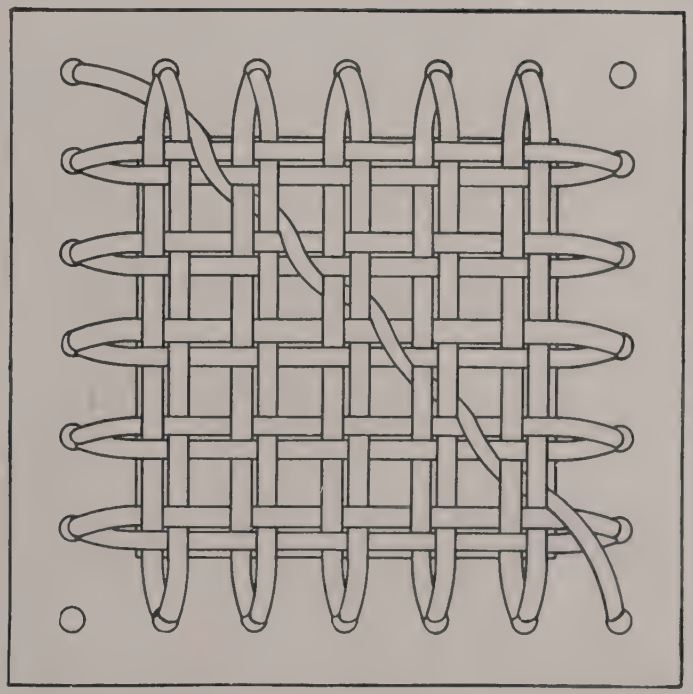


Fig. 128—Wrong Way to Start Fifth Step in Caning

and since it passes under the first horizontal group, it must pass under each horizontal group parallel to the first. when putting in the diagonal lines of cane, two parallel lines begin or end in the same hole at the corners. Fig. 128 shows the wrong way to begin.

Sixth Step: In this step, it will be observed that the cane is carried from the back left corner to the front right corner, over the first vertical group and under the first horizontal group, thus making these diagonals perpendicular to the first. It is now seen that where the first diagonals passed under the ver-

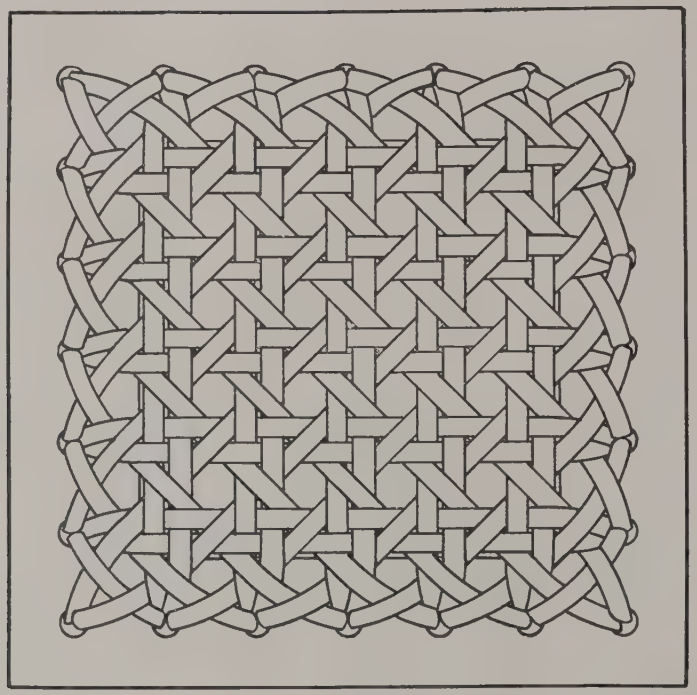


Fig. 129—Sixth Step, Caning Complete

tical group in the fifth step, the second diagonals pass over the vertical group, as in Fig. 129. Great care should be taken to have the cane so drawn in, that the right side is always to the outside. This is done only by drawing the strand between the thumb and the fore-finger.

The Binder

The binding cane is broader than that used in the weaving. Its use is to cover up the rows of holes through which the weaver has been drawn. There was a time when the binder was considered absolutely necessary. It is no longer considered so. Much of the very best caned furniture is left without a binder.

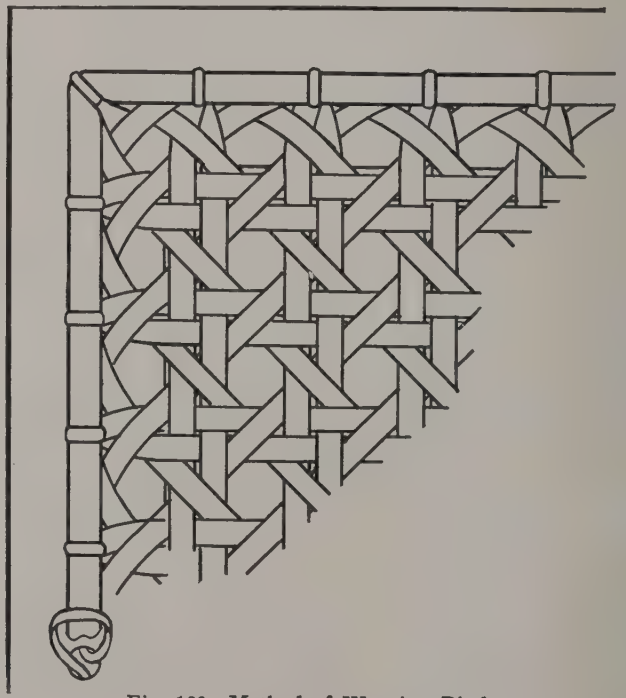


Fig. 130—Method of Weaving Binder

The binding is a simple process, and is done in the following way: Pull a cane, similar to that used in the weaving, up through a hole. Lay the cane, to be used as a binder, over the hole, and pull the cane over it, allowing it to pass down through the same hole. This makes a loop over the binder, holding it secure. This is continued around the entire chair. The binder is shown along the left edge of Fig. 130.

The Trim

When the under side of a piece of caned work is exposed, it often detracts from the general appearance of the finished article. In such a case, narrow

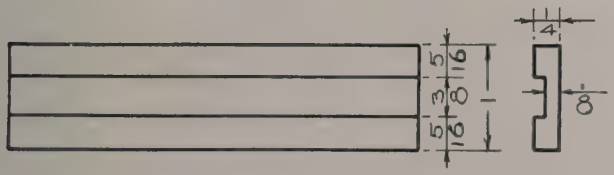


Fig. 131—Sketch of Trim

strips of wood may be grooved, as shown in Fig. 131, and tacked over the unsightly parts, thus giving it a neatly finished appearance, as in Fig. 132.

Fig. 133 shows a finished fernery.

Four-Step Caning

Fig. 134 shows a finished magazine rack with sides woven in the four-step cane. The working drawing is shown in Fig. 135.

Fig. 136 shows the various steps to follow in the four-step caning. While this work is not so substantial as the six-step caning, it has a place in the workshop, and especially in problems where any great strength is not required. The holes are

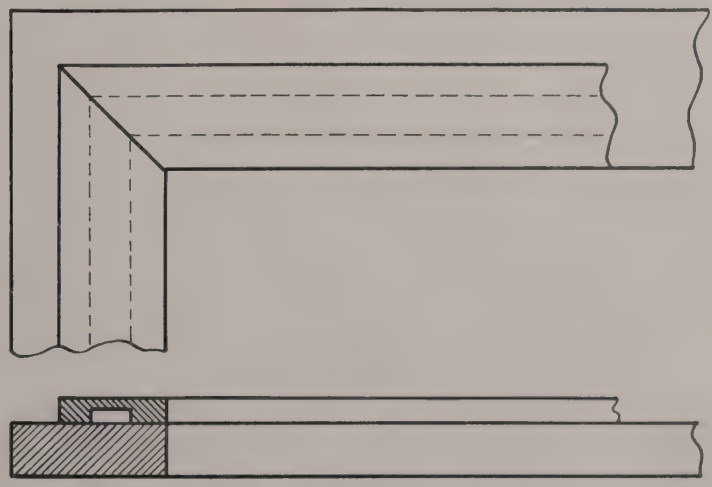


Fig. 132—Trim Applied to Under Side of Caned Panel

Fig. 133—Fernery

marked off and bored the same as previously described. The cane is first carried across the opening vertically; then across horizontally, crossing the vertical strands at right angles. Following this step, the first diagonal is carried from the upper right corner to the lower left, as shown in the drawing. In the fourth step, the diagonal is started in the upper left corner, brought over the first diagonal and under the intersection of the other strands, making simple under and over weaving, as shown in Fig. 136.

Figs. 138, 139, and 141 show very interesting footstools in which cane plays a very important part in the construction.

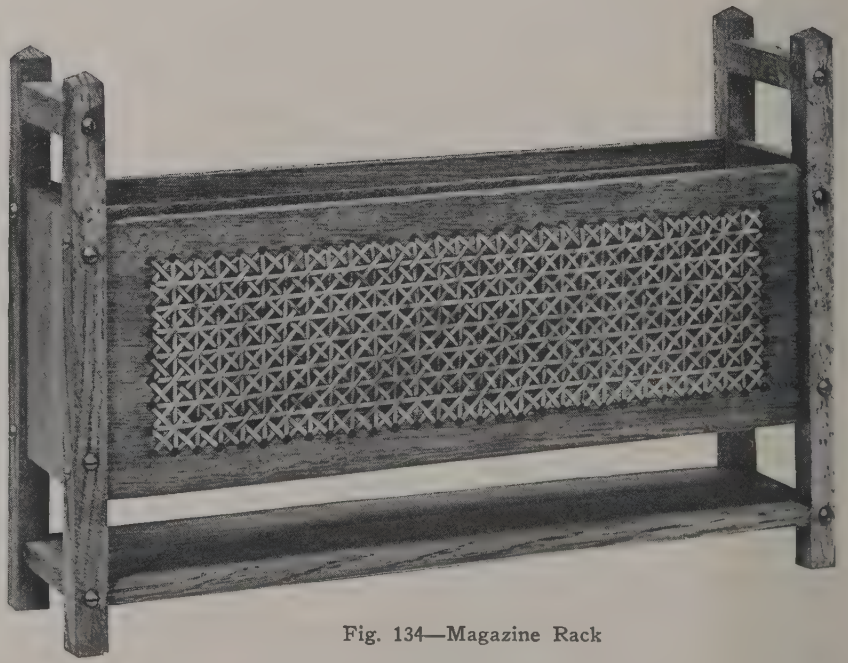


Fig. 134—Magazine Rack

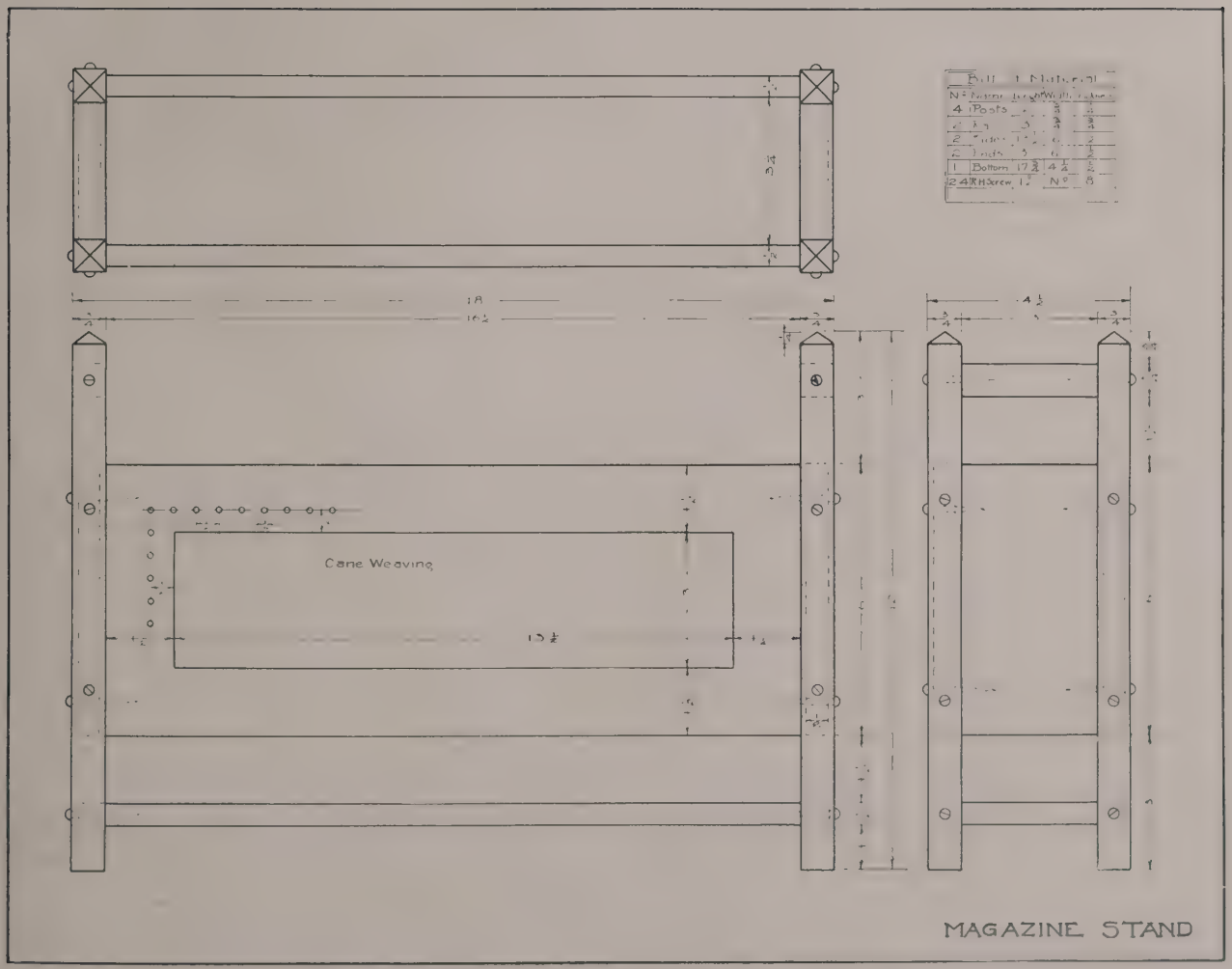


Fig. 135—Working Drawing of Magazine Stand (Seventh Grade)

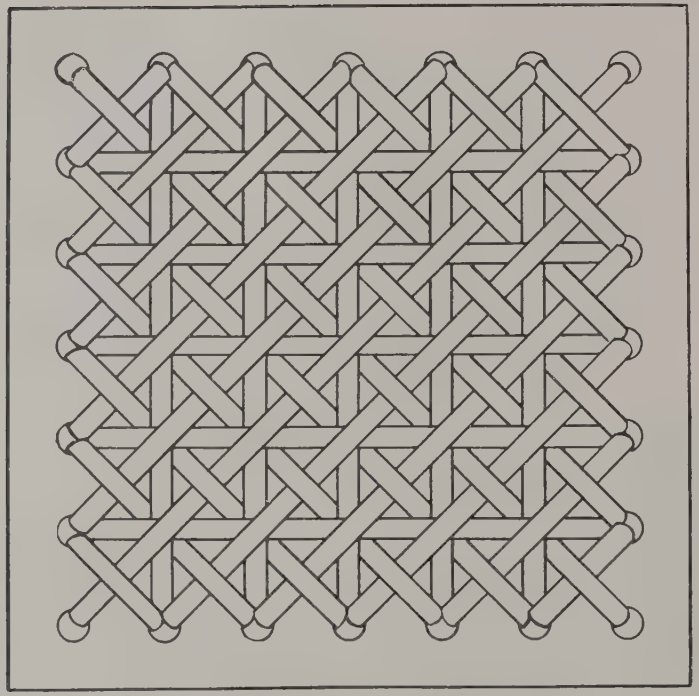


Fig. 136—Four-Step Caning Completed

Figs. 137 and 140 show working drawings for the foot-stools above mentioned.

In Fig. 138 is shown a binder of broad binding cane forced into a groove. When the binder is used in this way, a groove as wide as the binder and about 3/16 in. deep is cut coincident with the holes before the weaving is started.

It is after the caning has been completed that the binding cane or half-round reed is forced into the groove. A small amount of glue, and occasionally a $\frac{5}{8}$ in. brad, is used to hold the binder in place.

Fig. 143 shows the working drawing for a combination box and foot-stool. Owing to the small flats and so often crowded conditions in the homes, it is advisable to make combination problems, as shown in Fig. 142. In this problem there is a very interesting, stool, foot-stool, and shoe box.

Fig. 144 shows the drawing for a plant stand.

Fig. 145 shows the completed stand.

Fig. 146 is a working drawing for a hall mirror. This problem may be worked out very successfully by any eighth-grade pupil.

Fig. 147 shows the finished mirror.

Fig. 148 shows the working drawing for a sewing stand.

Fig. 149 shows the finished stand.

Figs. 150, 152, and 154 show working drawings of waste baskets, while Figs. 151, 153, and 155 show the finished products.

The leg rest shown in Figs. 156 and 157 makes a most interesting problem to be taken into the home.

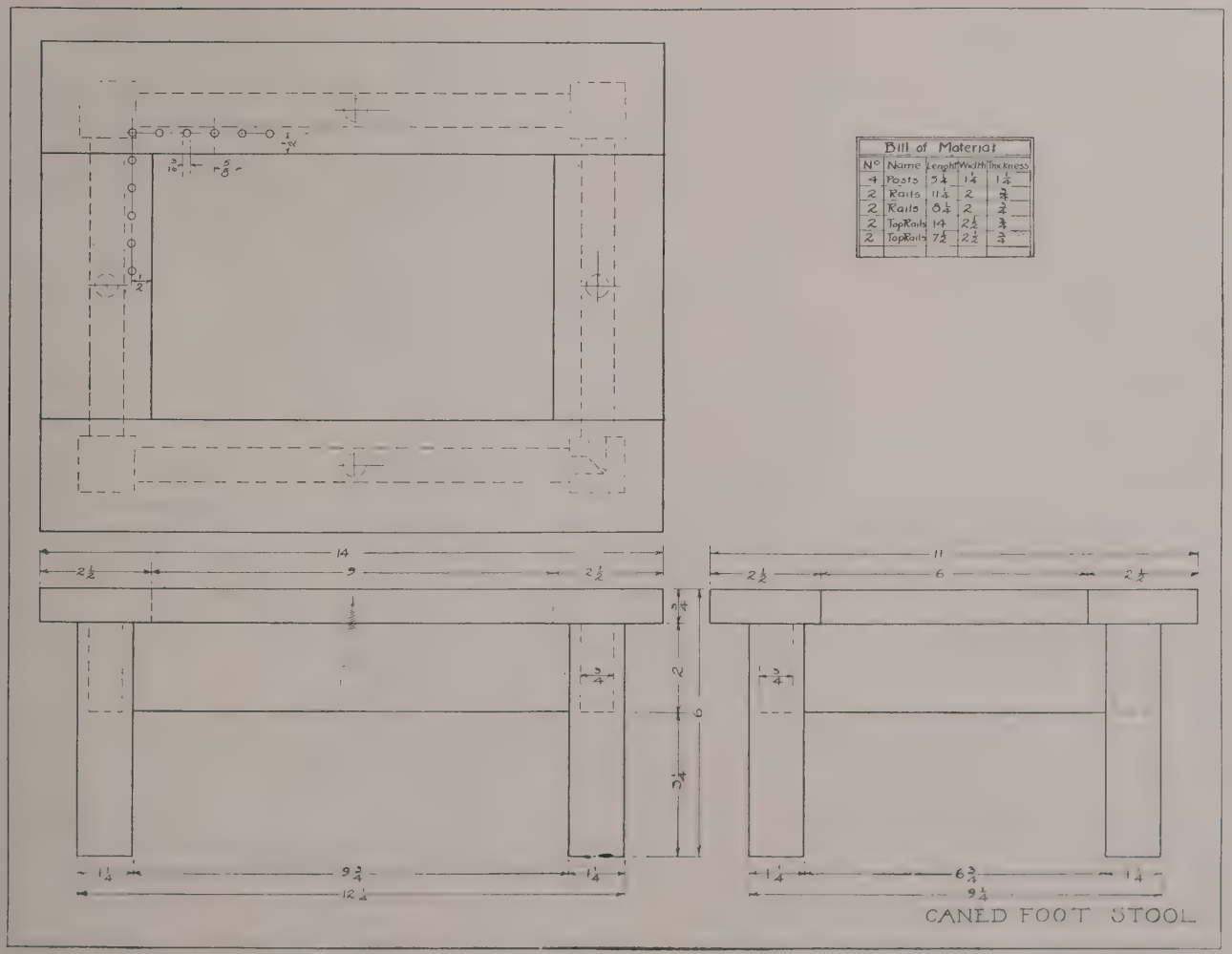


Fig. 137—Working Drawing of Caned Foot Stool (Eighth Grade)

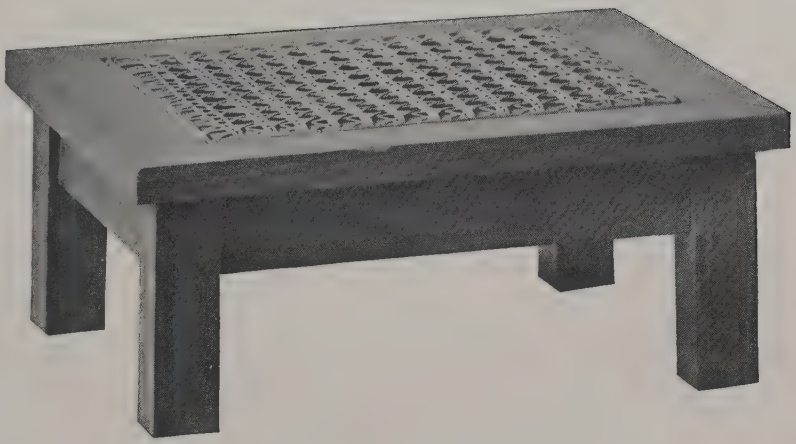


Fig. 138—Low Foot Stool. Caned Top

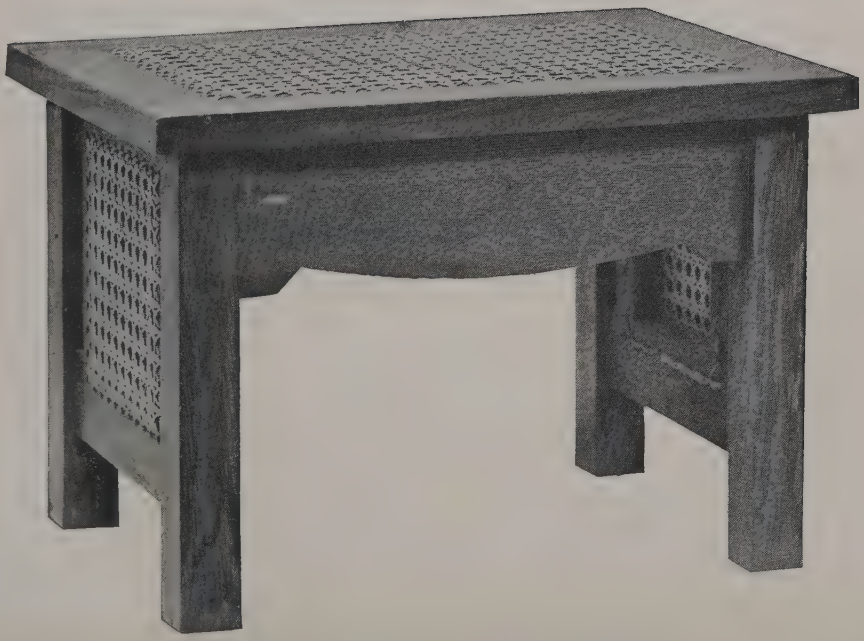


Fig. 139—Foot Stool. Caned Top and Ends

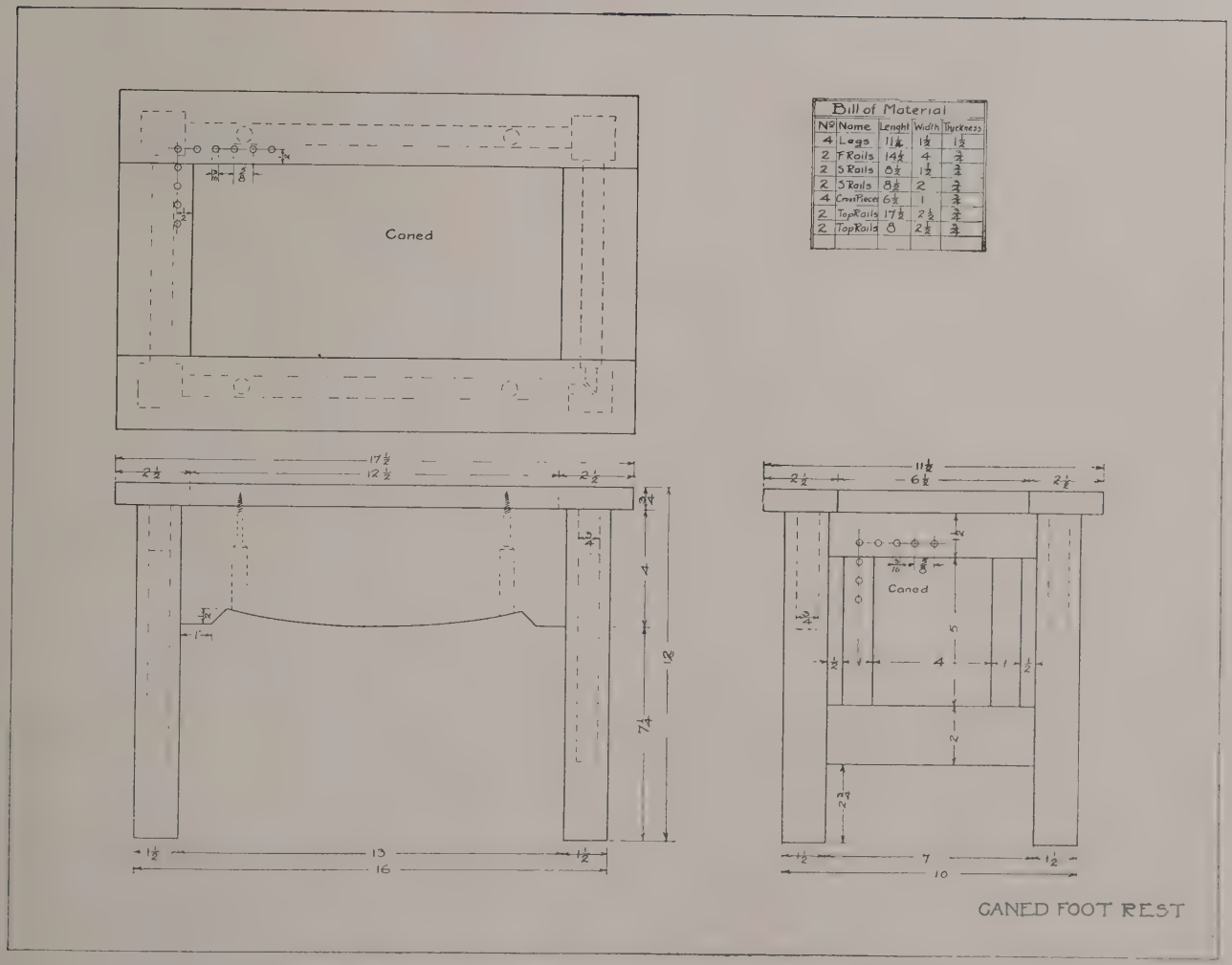


Fig. 140—Working Drawing of Caned Foot Rest (Eighth Grade)

Fig. 141—Foot Rest. Caned Top, Sides and Ends

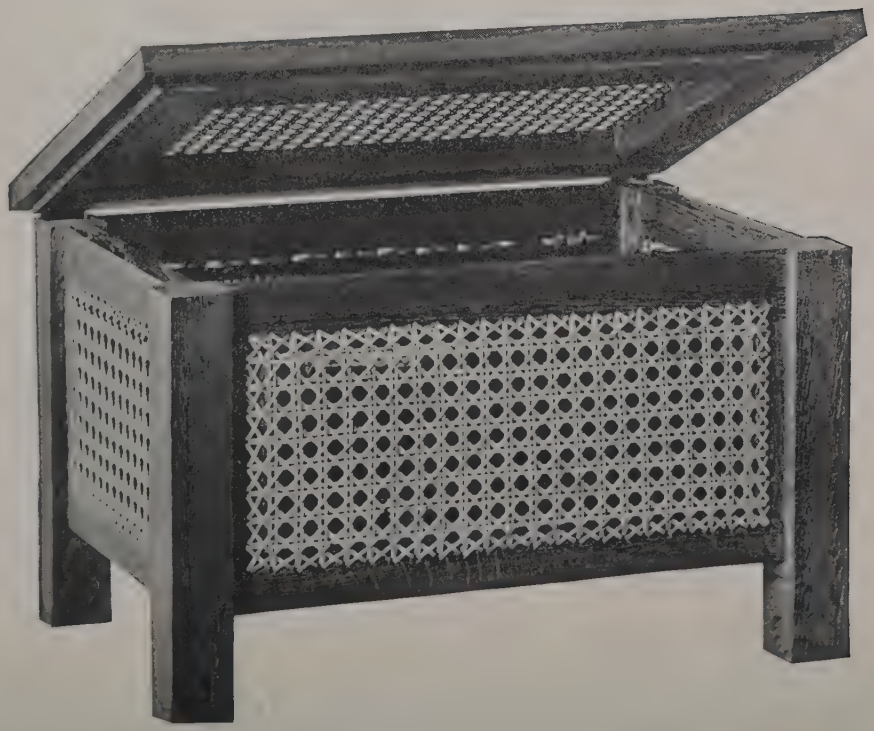


Fig. 142—Combination Foot Stool and Box

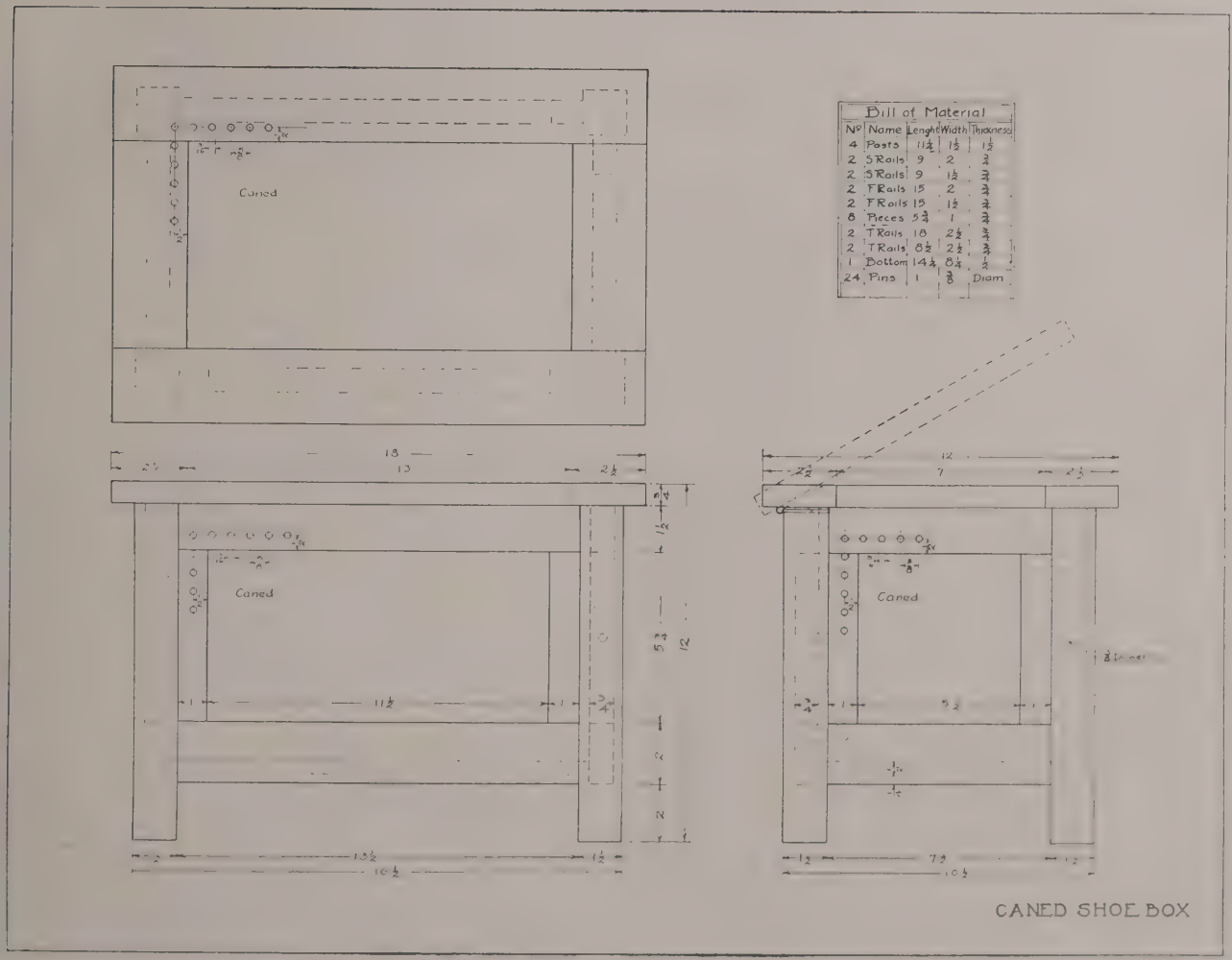
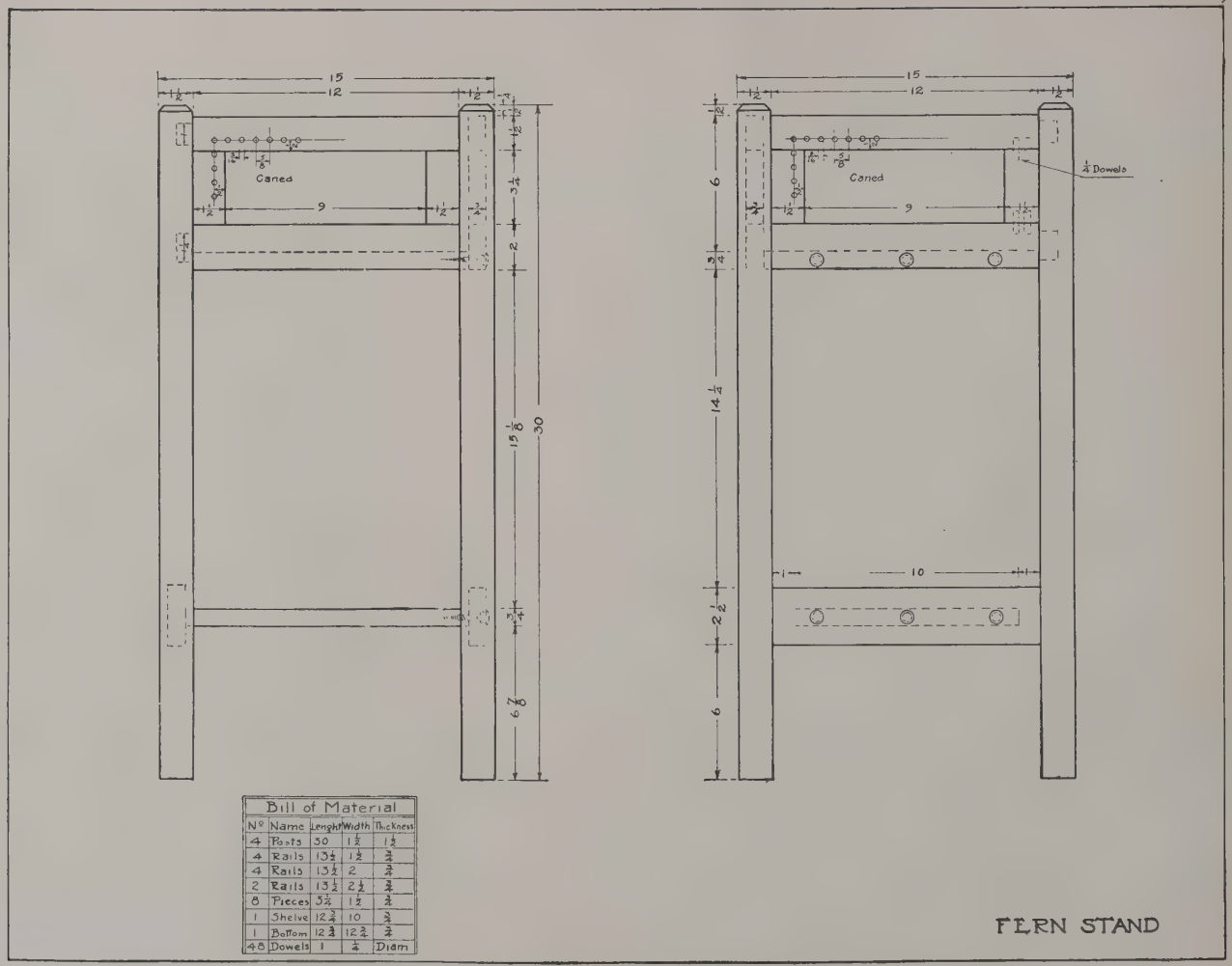


Fig. 143—Working Drawing of Caned Shoe Box (Eighth Grade)



Bill of Material

No	Name	Length	Width	Thickness
4	Posts	30	1½	1½
4	Rails	13½	1½	¾
4	Rails	13½	2	¾
2	Rails	13½	2½	¾
8	Pieces	5½	1½	¾
1	Shelve	12¾	10	¾
1	Bottom	12¾	12¾	¾
48	Dowels	1	¼	Diam

Fig. 144—Working Drawing of Fern Stand (Eighth Grade)

There are few pupils in the grades who are ambitious enough to undertake a problem larger than a Morris chair. In planning for such a problem, care should be taken that the designer holds to one line of design. He should not be allowed to upholster the seat, cane the sides, and have slats for the back. Such a combination is too much for one chair. If leather is used in the seat, it might be used for the back or the back might be caned.

Fig. 158 gives the working drawing for a Morris chair, while Fig. 159 shows the completed chair.

Care must be taken not to allow too great a contrast between the natural color of the cane and the finish of the wood with which it is used. It is often advisable to give the cane a coat of the same stain as used on the wood. Owing to the hard, shiny surface of the cane, only a very small amount of the oil or acid stain is absorbed. This, however, gives a most pleasing contrast, and is not so extreme as to attract attention.

Fig. 160 shows the working drawing of a tea table.

Fig. 161 shows a finished table without the use of cane.

Fig. 162 shows the table with caned ends.

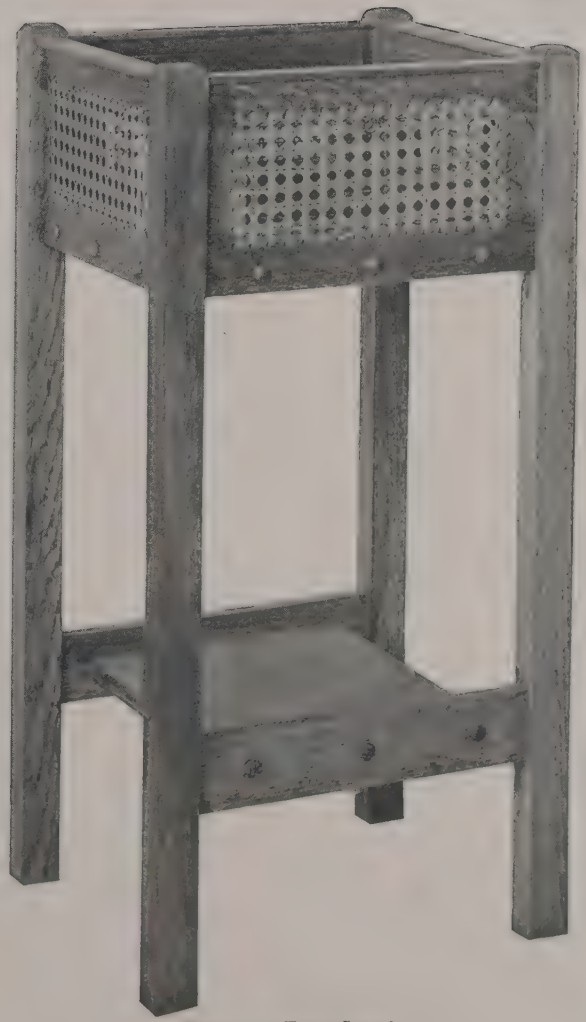
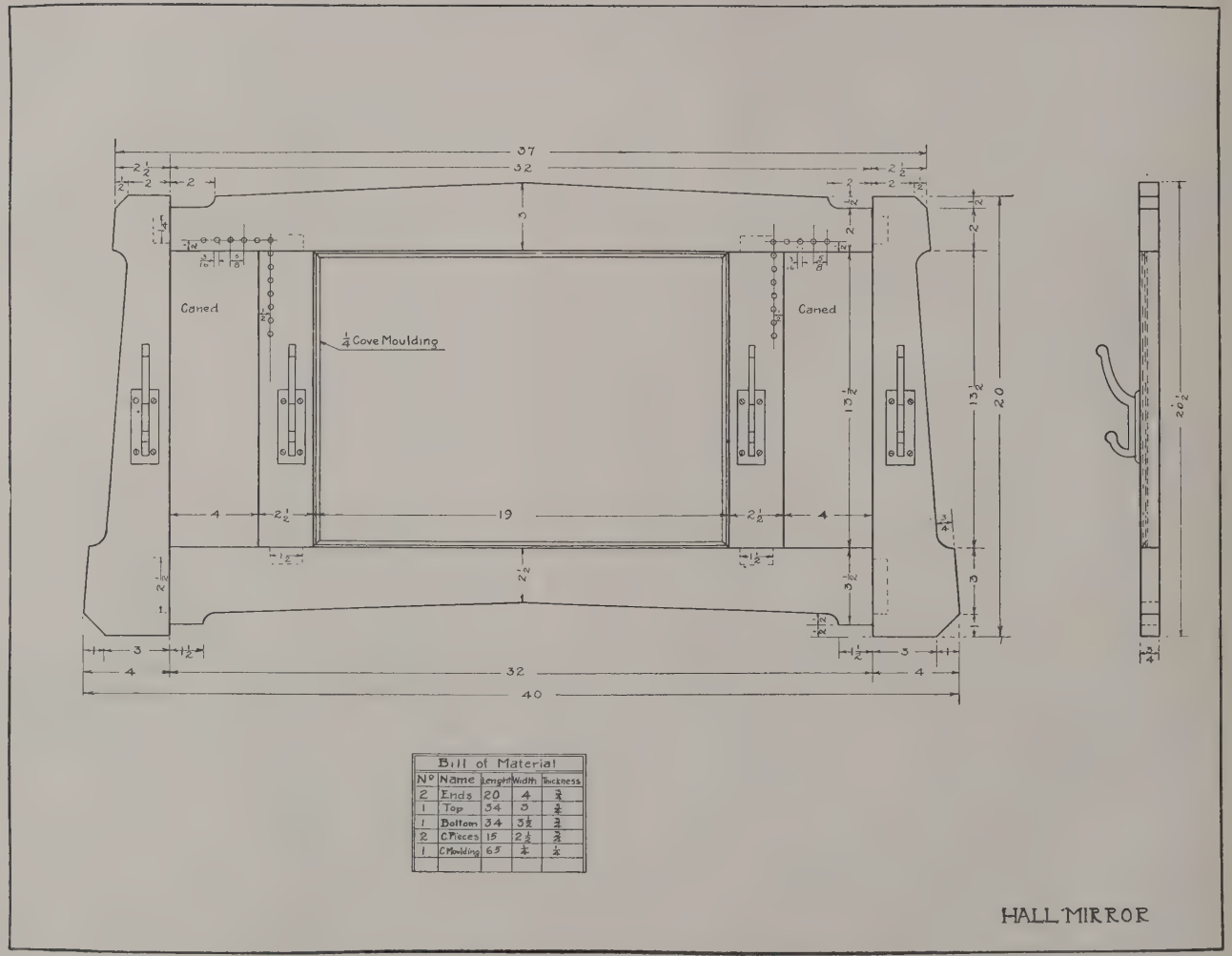


Fig. 145—Fern Stand



Bill of Material

N°	Name	Length	Width	Thickness
2	Ends	20	4	¾
1	Top	34	3	¾
1	Bottom	34	3½	¾
2	C Pieces	15	2½	¾
1	C Moulding	65	¼	¼

Fig. 146—Working Drawing of Hall Mirror (Eighth Grade)

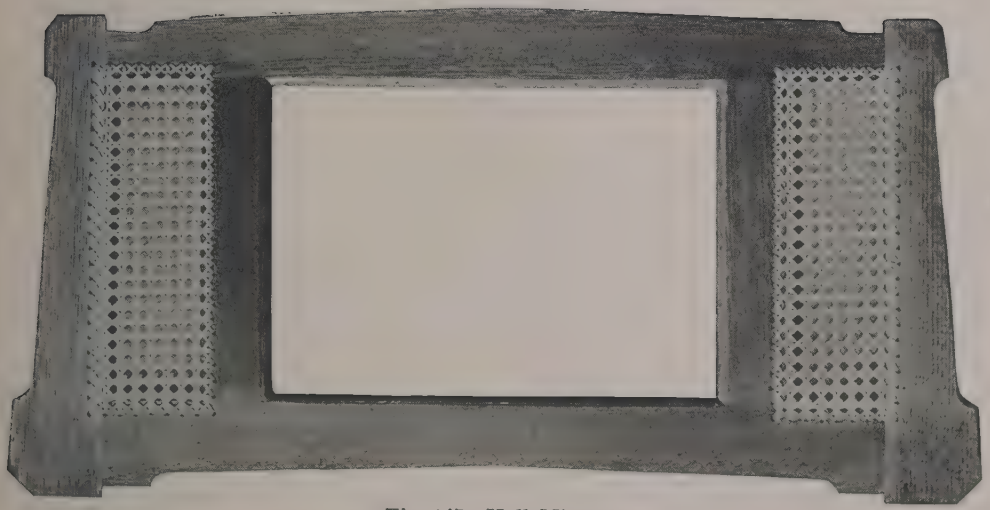


Fig. 147—Hall Mirror

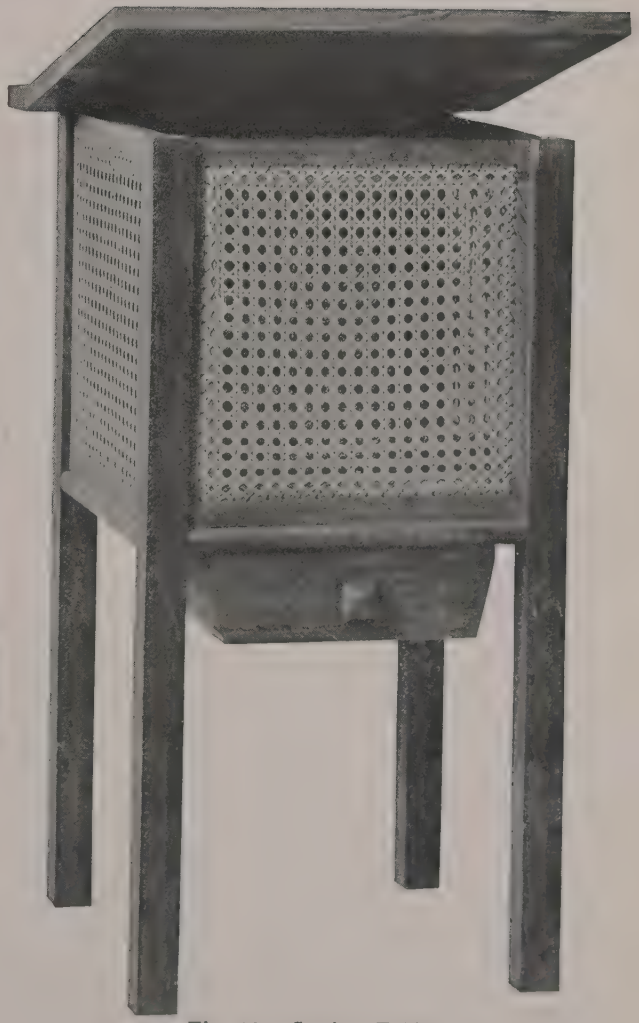
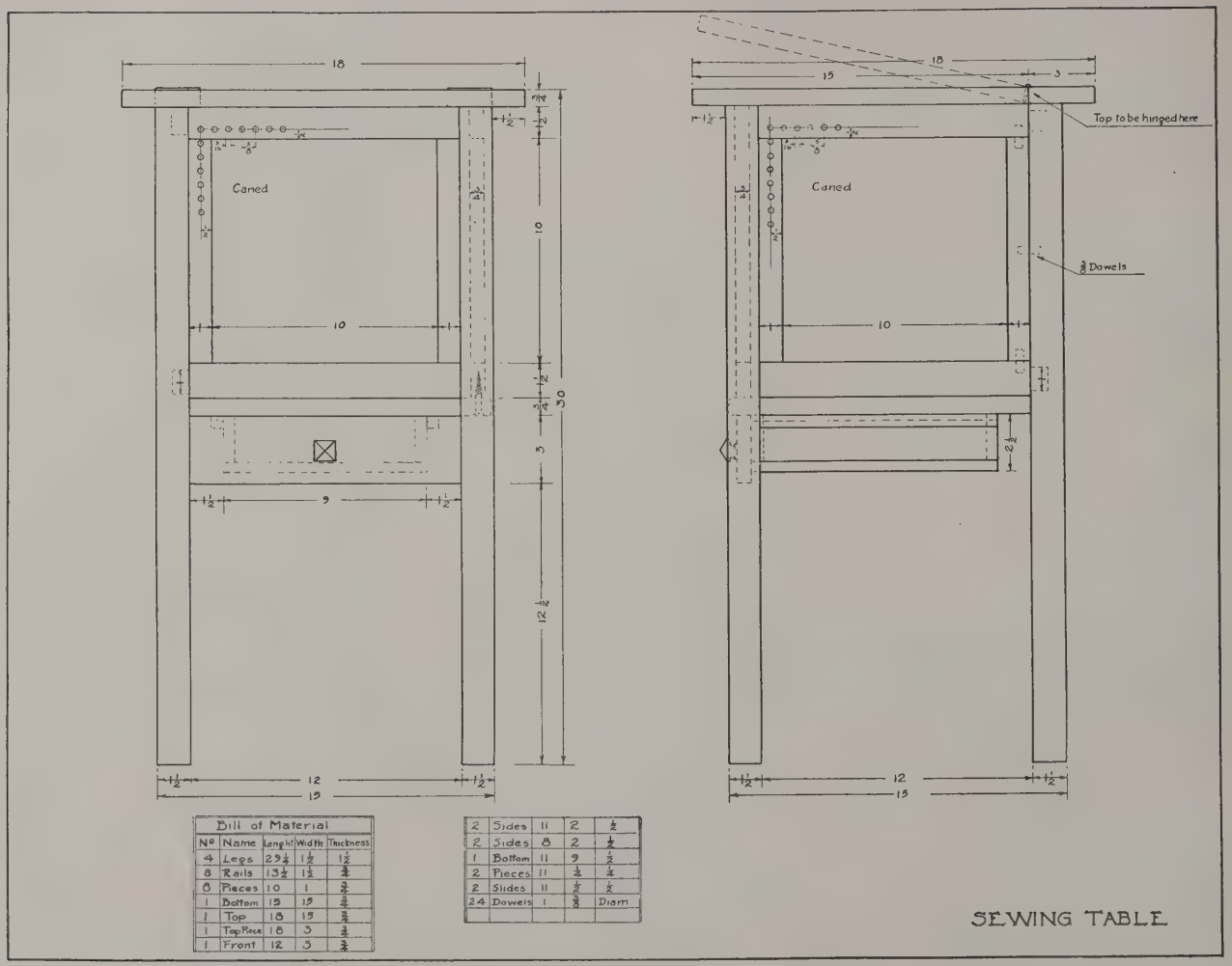


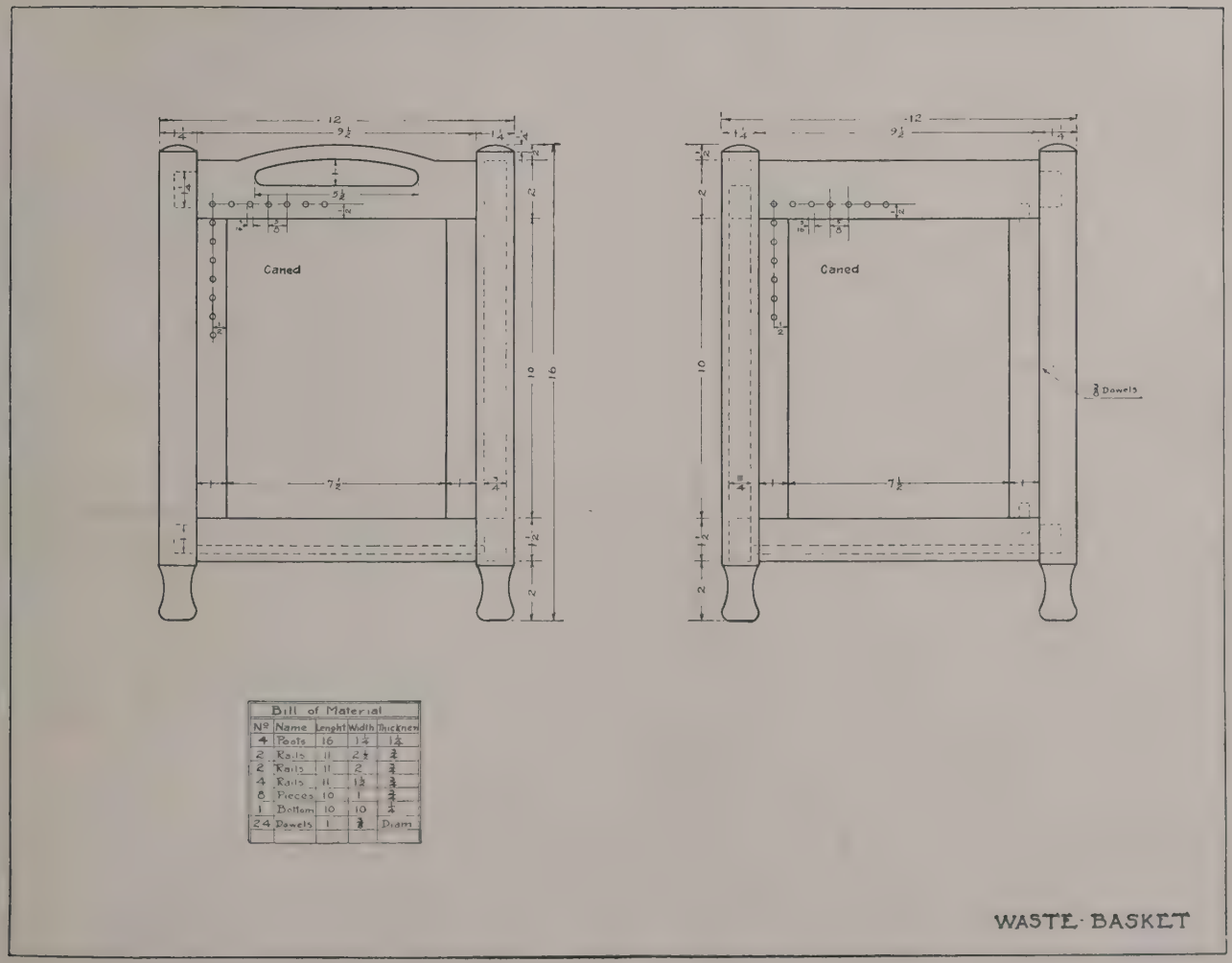
Fig. 149—Sewing Table



Bill of Material				
No	Name	Lenght	Width	Thickness
4	Legs	29¼	1½	1½
8	Rails	13½	1½	¾
8	Pieces	10	1	¾
1	Bottom	13	13	¾
1	Top	18	15	¾
1	Top Piece	18	3	¾
1	Front	12	3	¾

2	Sides	11	2	½
2	Sides	8	2	½
1	Bottom	11	9	½
2	Pieces	11	¼	¼
2	Slides	11	½	½
24	Dowels	1	⅜	Diam

Fig. 148—Working Drawing of Sewing Table (Eighth Grade)



Bill of Material				
Nº	Name	Lenght	Width	Thickness
4	Posts	16	1¼	1½
2	Rails	11	2½	¾
2	Rails	11	2	¾
4	Rails	11	1½	¾
8	Pieces	10	1	¾
1	Bottom	10	10	¼
24	Dowels	1	⅜	Diam

Fig. 150—Working Drawing of Waste Basket (Eighth Grade)

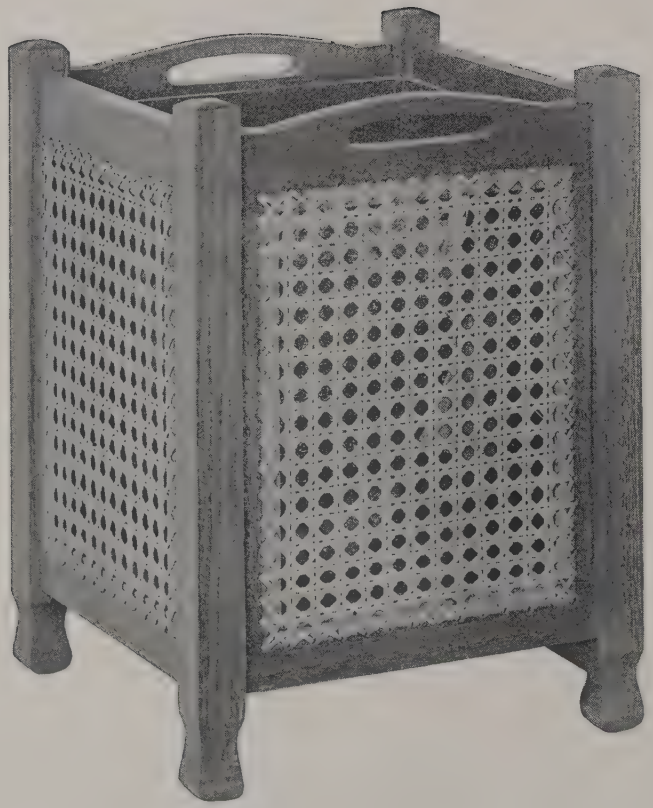


Fig. 151—Waste Basket

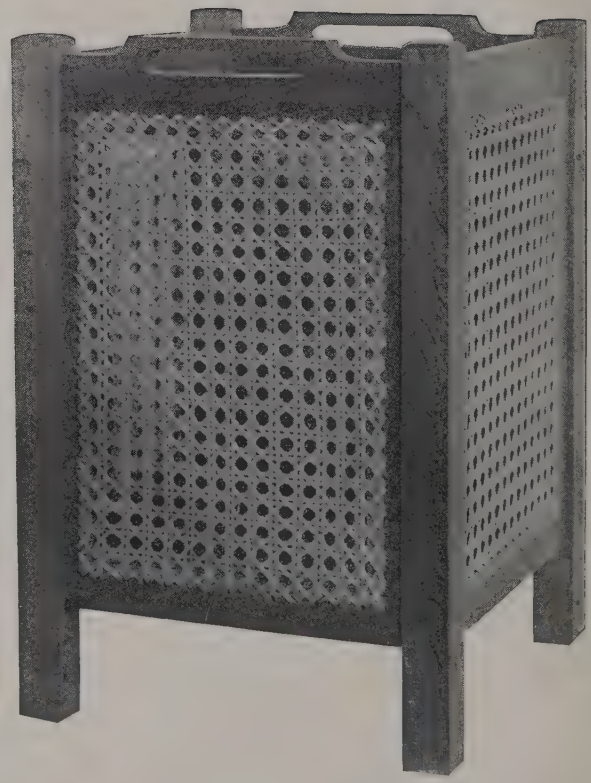


Fig. 153—Waste Basket

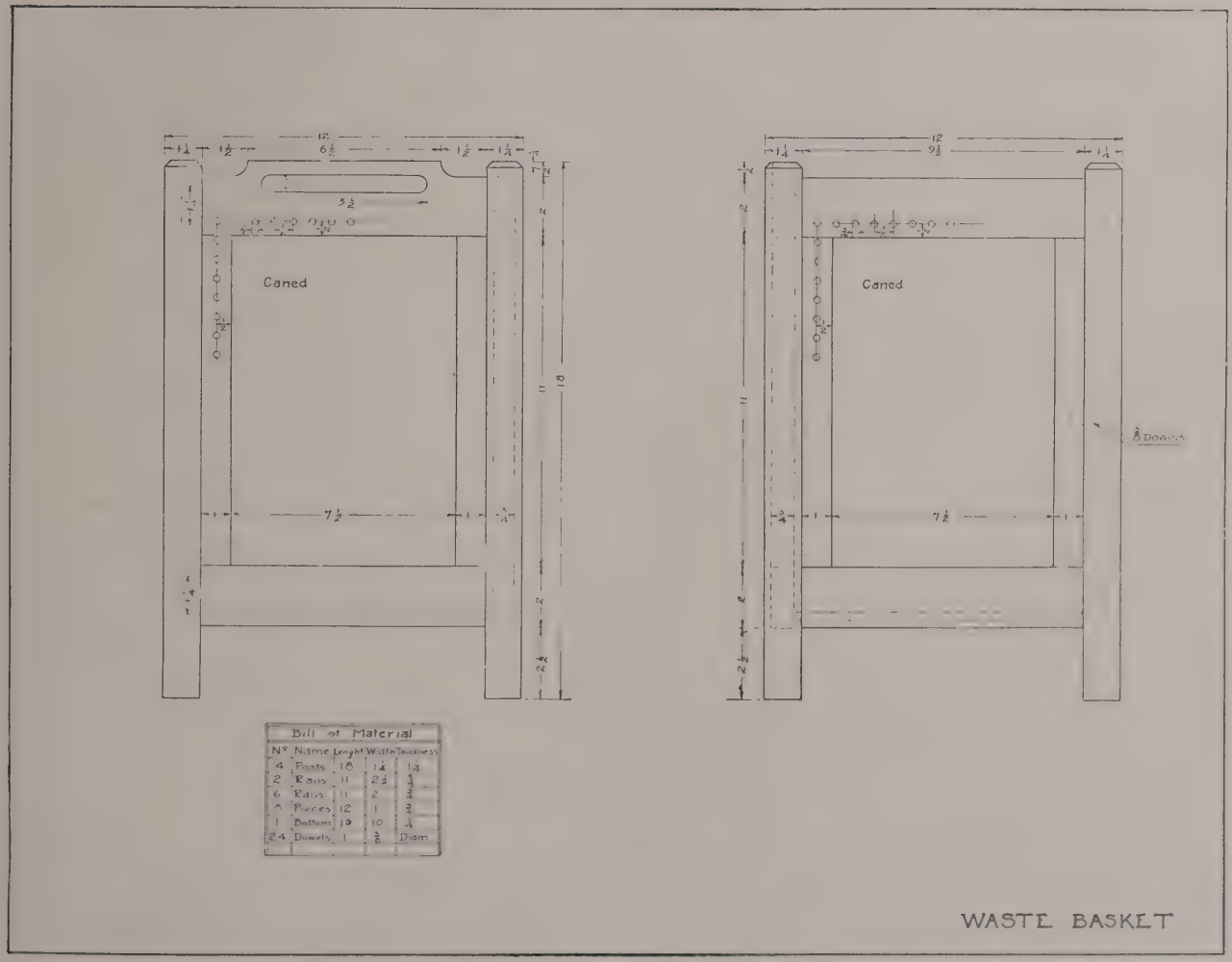
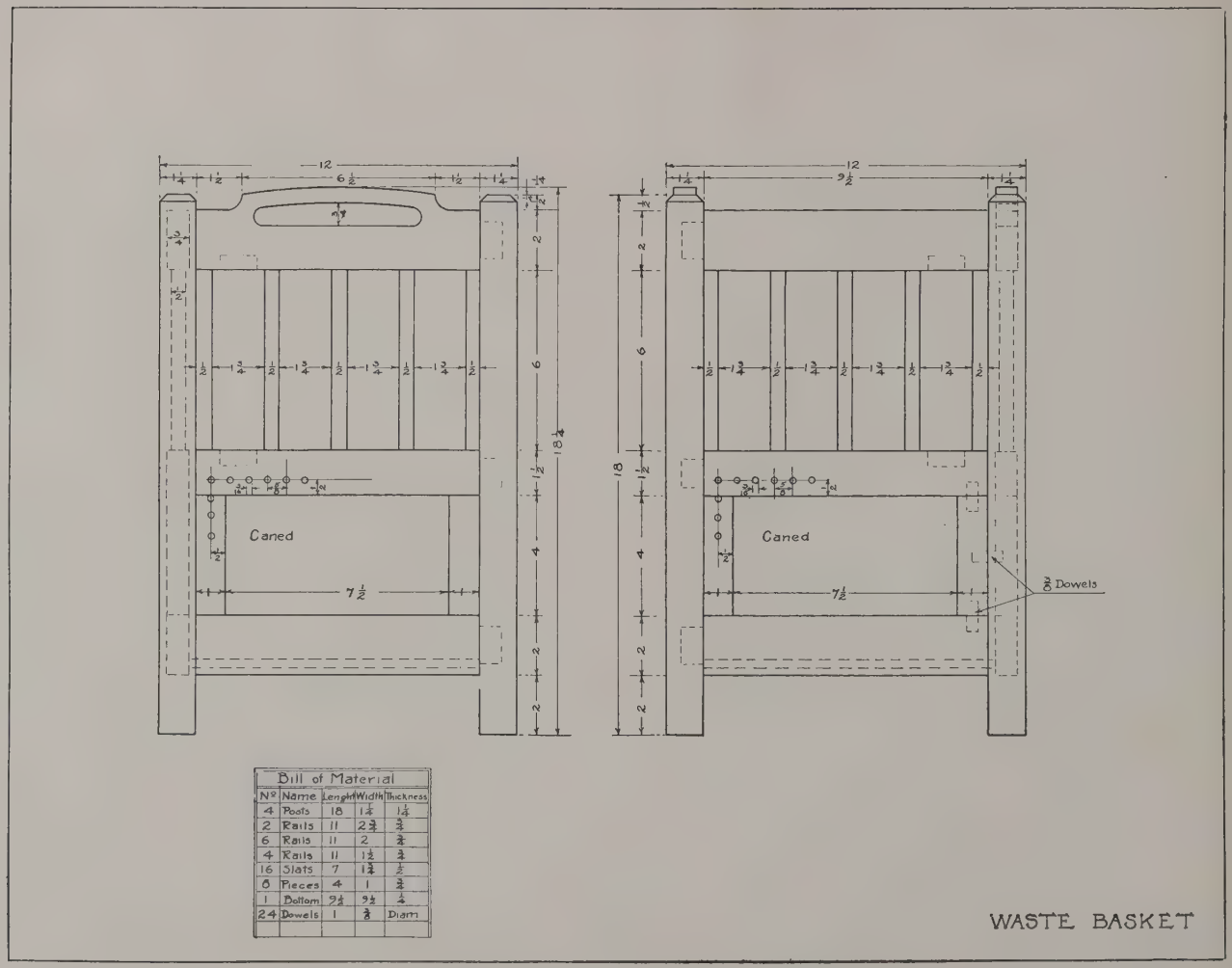


Fig. 152—Working Drawing of Waste Basket (Eighth Grade)



Bill of Material

Nº	Name	Length	Width	Thickness
4	Posts	18	1¼	1¼
2	Rails	11	2¾	⅞
6	Rails	11	2	⅞
4	Rails	11	1½	⅞
16	Slats	7	1½	½
6	Pieces	4	1	⅞
1	Bottom	9½	9½	¼
24	Dowels	1	⅜	Diam

Fig. 154—Working Drawing of Waste Basket (Eighth Grade)

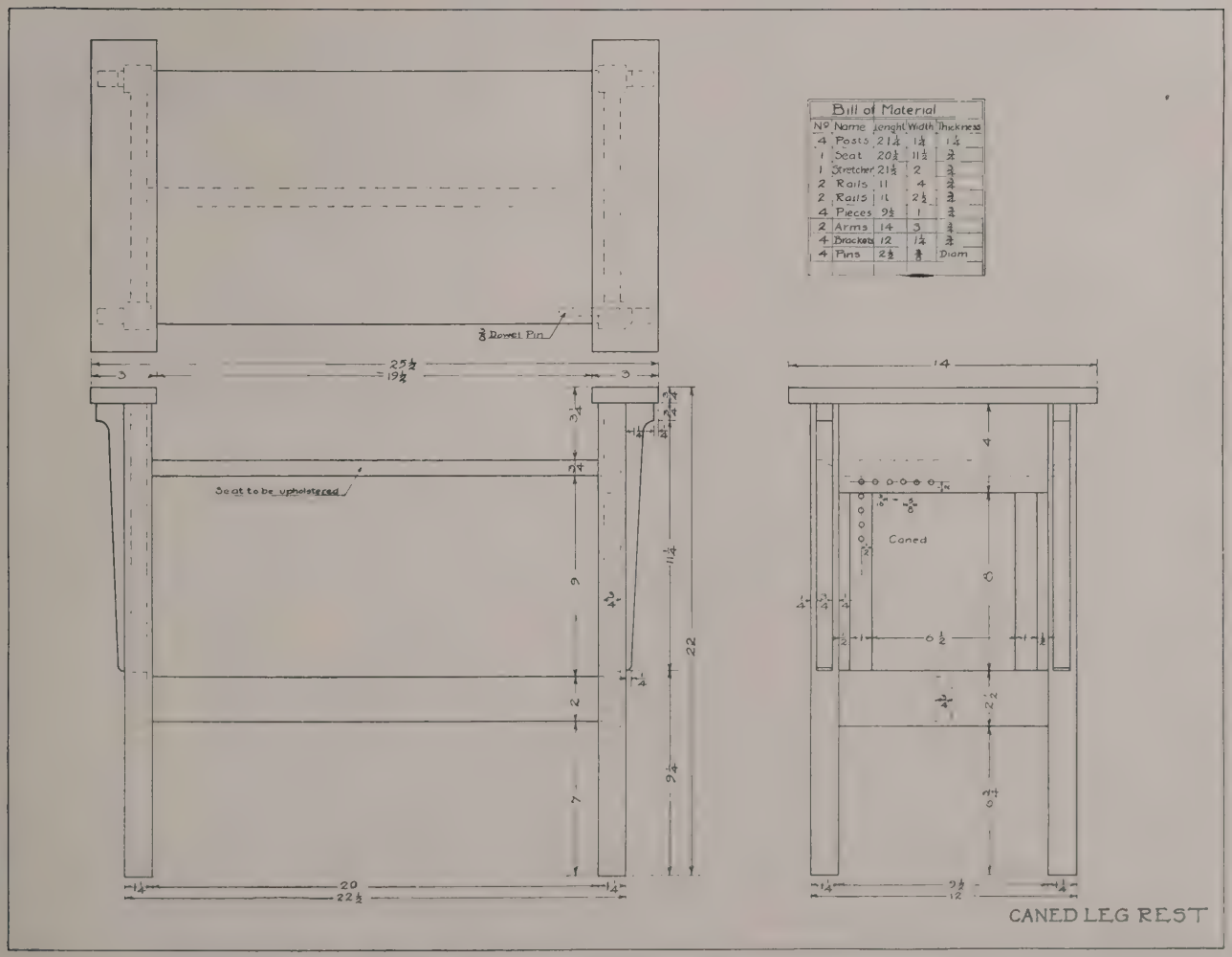


Fig. 156—Working Drawing of Caned Leg Rest (Eighth Grade)

Fig. 157—Leg Rest

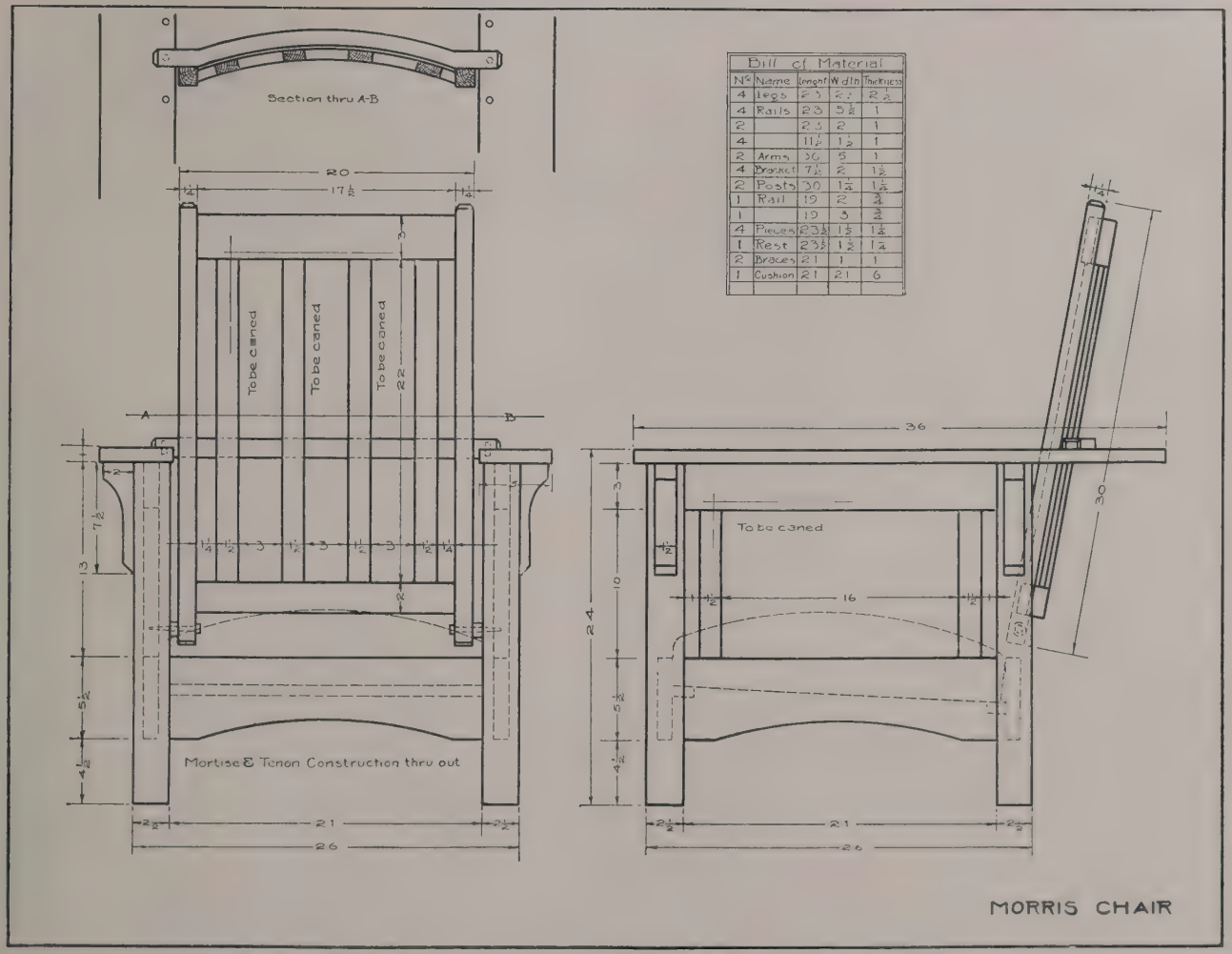


Fig. 158—Working Drawing of Morris Chair (Eighth Grade)

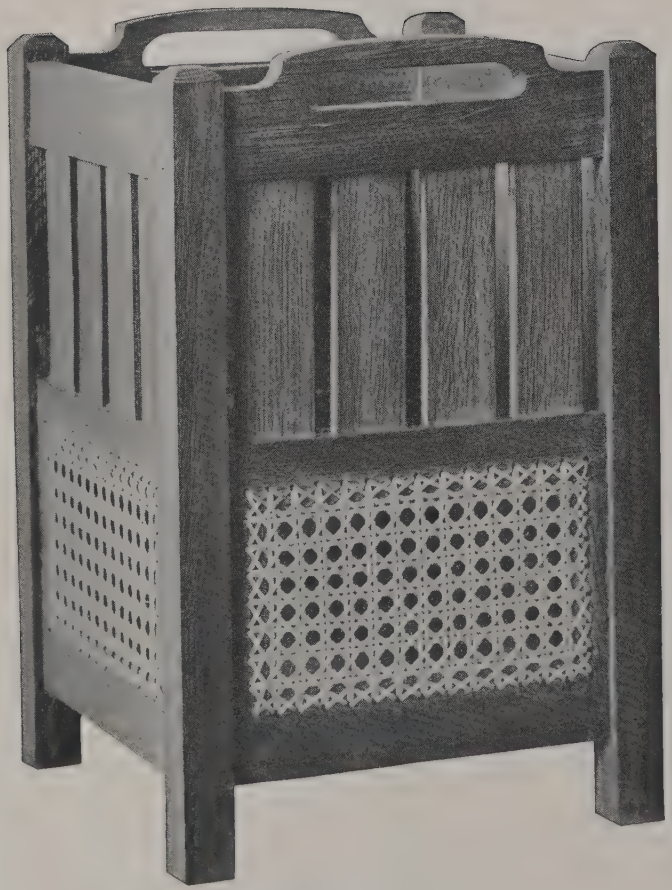
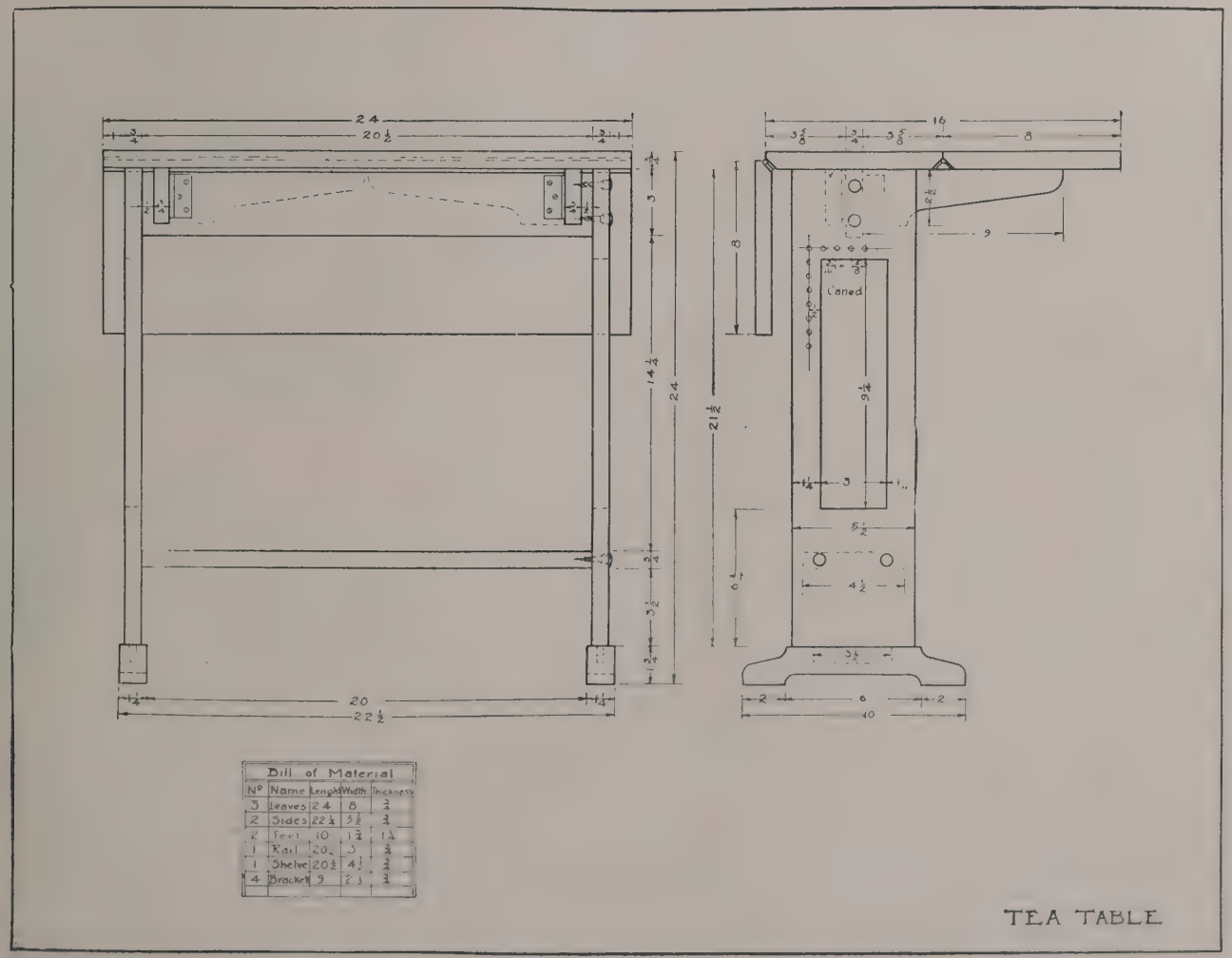


Fig. 155—Waste Basket

Fig. 159—Morris Chair



Bill of Material				
N°	Name	Length	Width	Thickness
3	Leaves	24	8	¾
2	Sides	22¼	3½	¾
2	Feet	10	1½	1¼
1	Rail	20½	3	¾
1	Shelve	20½	4½	¾
4	Bracket	9	2½	¾

Fig. 160—Working Drawing Caned Tea Table (Eighth Grade)

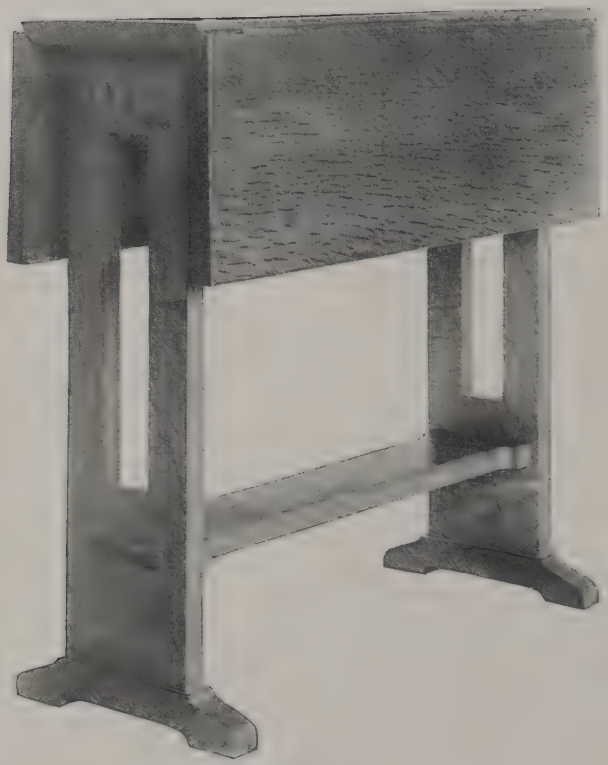


Fig. 161—Tea Table. Open Ends

Fig. 162—Tea Table. Caned Ends

To Cane an Old Chair

It is not necessary to go into all the details of caning an old chair, as such a problem solves itself to one who has had even a little experience in chair caning. What may seem confusing in any line of repair work, very soon straightens itself out when the worker begins the actual operation of caning.

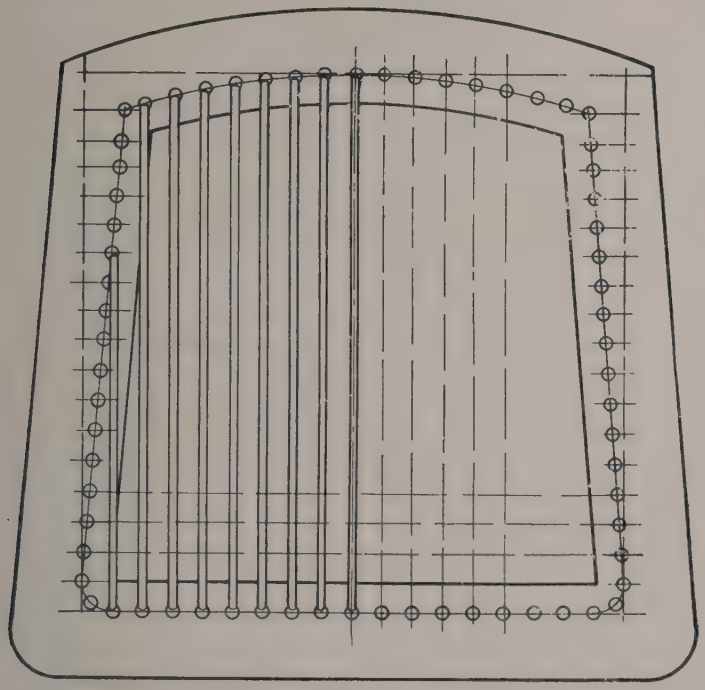


Fig. 163

Even irregular openings are simple after a little practice in the more regular forms above mentioned.

Fig. 163 shows the caning of the irregular chair seat.

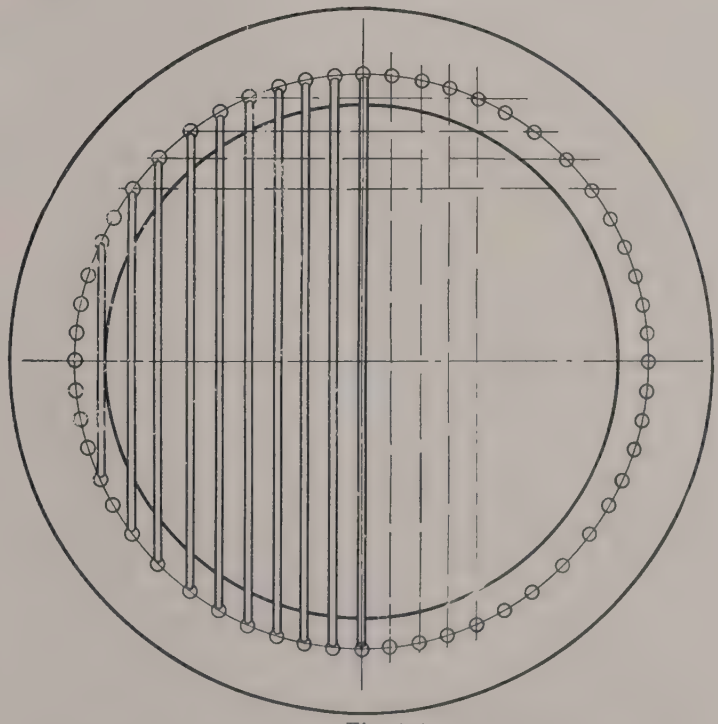


Fig. 164

Fig. 164 shows the caning of the circular chair seat.

CHAPTER VI.

Rush Seating

A few years ago, such materials as cane, pith cane, round reed, split reed, ash splints, willow, hickory splints, fibre cord, and rushes were considered a novelty when seen in the work rooms of our manual training schools. By degrees these materials are finding their way into the shops of the more progressive teachers, who believe any material that may be used in conjunction with wood has a legitimate place in the shops of our public schools.

Such materials not only add interest to the problems at hand, but also increase the pupil's knowledge of materials and possible combinations, thus broadening his horizon and making it possible for him to enjoy to a far greater degree not only the products of his own shop, but those of the art world in general. It aids him in discriminating in the commercial world between good and bad combinations. One appreciates this when he sees a group of boys gathered about the show windows of a furniture store admiring the display, and pointing out, in their limited way, the good qualities of certain combinations.

There is nothing new about the rush seating of stools and chairs. Rush is probably one of the oldest known materials used in conjunction with wood. History states that it was used in the valley of the Nile long before Christ. The museums of our eastern cities contain various examples of rush seating brought to this country by the early settlers from England, France, and Holland.

The real rush seating, as the name implies, calls for the rushes, or cat-tail flags which grow in the low, wet places along rivers and in sloughs. If rushes or cat-tail flags cannot be procured, heavy hemp or sisal twine or raffia are possible. In some sections of the country ropes of corn husks are used. In Europe, rye straw is wound over twine or grass, and is used in seats.

The most practical substitute in the north central section of the country is a twisted paper cord. It is usually shipped on spools of about 100 pounds each, and sells at from 12 to 15 cents per pound. It may be procured in several colors, green and brown being most commonly used for chair seating. One kind is especially pleasing in color. The prevailing color is brown, with just an occasional suggestion of green. Imitations, as a rule, are to be discouraged. Fibre cord, however, may be considered an exception, as it is a very substantial material and may be very successfully used in chair seats.

If rushes or cat-tail flags are used, they should be cut in August and the butt ends removed. The drying should be done in a dark place, as this aids in retaining some of the natural green in the drying stem. Care should be exercised not to break the stems. After they are thoroughly dried, they may be tied in bundles and stored away for future use. Before working, allow them to lie in a wet cloth to soften. When using, squeeze the air and water out by pressing each leaf from the top between the thumb and first finger.

Four leaves usually compose a strand. Twist in the same direction and keep uniform in size. With flags or rushes, the strands stretch underneath without twisting, and new leaves are introduced at the corners where the coil turns back for a new direction. The process of wrapping will be described a little later.

When raffia is used, color may be introduced. Raffia is well known throughout the grades because of its general use in basketry. The original source of all materials should be considered, and well gone over at the time of their introduction.

The writer well remembers the time when this phase of the work was neglected. A large supply of raffia had just been delivered to the school and left in the office. As the material was to be dyed, several boys of the upper grades were asked to assist in the opening of the braided bundles. This made a loose pile of grass-looking material in one corner of the office. Just at this point a little girl came to inquire for a pair of lost mittens. She was referred to the "lost-and-found box," which was at this particular moment under the pile of raffia. As the little girl was leaving the office she was asked if she had found her mittens. Her reply was that she could not get near the "lost-and-found box" because there was so much hay around it. There are scores of pupils who have used raffia in various ways, who have been allowed to go on thinking that raffia is a kind of grass.

In a recent article, raffia was described as being the leaf of a certain palm. One needs only to dampen it and observe how nearly transparent it is, to know that it cannot be the leaf itself. Raffia is the outer covering stripped from the leaf of a certain palm, which grows very extensively in Madagascar. If raffia is used it should not be soaked, but like the cat-tail flags, it should be wrapped in a damp cloth, which moistens it sufficiently for twisting purposes.

Rush seating cannot be called weaving. It is more properly called wrapping.

For the rush bottom or cord seat, a frame is provided with rounded edges and definite, substantial corners (Fig. 165) that rise a little above

the connecting frame and suggests how thick the coil should be.

Fig. 166 shows the direction pursued by the cord in wrapping a chair seat. Beginning with the upper

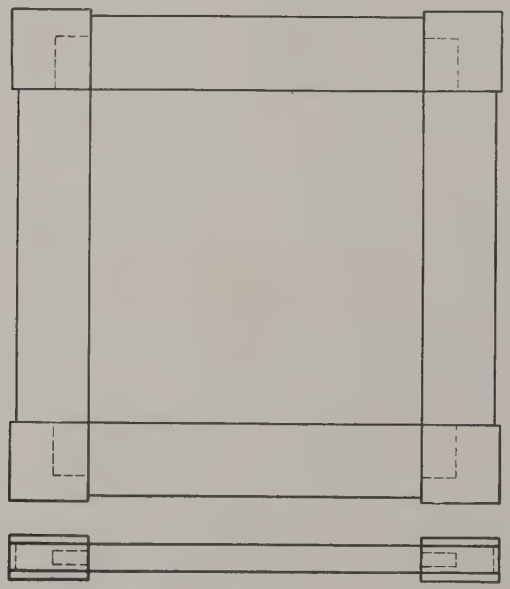


Fig. 165—Frame for Wrapping

right-hand corner, lay one end of the twisted cord on top of the rail, allowing the end to extend, as shown at "A"; allow the cord to pass over the edge and under the rail, as shown at "A," then over the top and edge of the rail marked "B." This binds the starting end. Pull the cord right under the rail at "B" and carry it directly across to the upper left corner of the frame and over the top at "C," around the

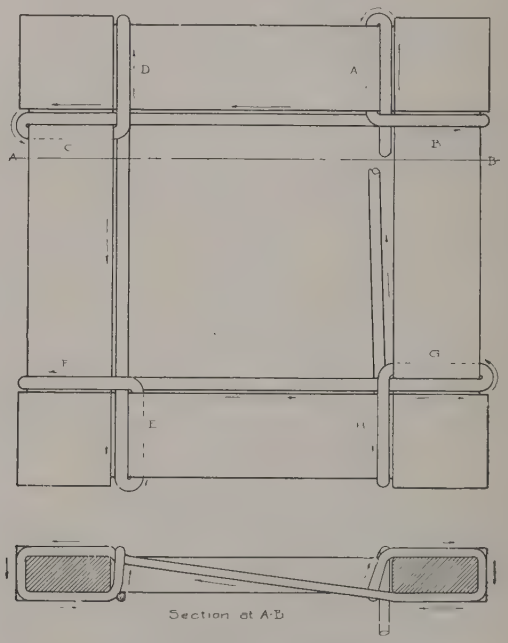


Fig. 166—Method of Wrapping

edge and under the rail at "C," then over the top of the rail at "D," over the edge and under the rail at "D," directly across to the lower left corner, over

the top of the rail at "E," around and under the rail at "E," and then over and under the rail at "F," across to the lower right corner, over the rail at "G," around the edge and under "G," over the rail at "H," around the edge and under the rail at "H," back to the upper right hand corner. The same course is repeated each time around. Care should be exercised to have the cord fit closely where it passes over the rails. Do not allow the strands to overlap at the corners as the work progresses. Sometimes it becomes necessary to force the strand together by using a block of wood and a mallet.

The fiber cord being of paper prevents it from being soaked in water for any length of time. By dipping it into the water and allowing it to remain but a moment, enough water is absorbed to make the handling of the cord somewhat easier and in drying out it tightens about the frame, making smoother work.

Splicing the Cord

When the end of the cord is reached, the amateur usually tacks it to the under side of the frame. The new piece of cord is begun also by tacking. Even a beginner may learn to do the splicing. Take a piece of new cord of the desired length and splice the end (which is made by severing the cord from the spool) to the end of the frame. This is done by untwisting each of the ends and cutting away a slanting piece of each. These two ends are now overlapped and twisted together. The other end of the new piece of cord will not twist with the end on the chair frame.

Splicing and Twisting the Rush

In using rush, the twisting is done as the wrapping progresses. It is done by rubbing the rushes against the thigh with the palm of the hand. When several strands of raffia or rushes are used in making the twist, different lengths are chosen, thus making the twist continuous by adding one strand at a time. Those experienced in rush seating think it quite impossible for the average eighth-grade boy to do chair seating with the rushes, as the twisting is an art which is acquired only by a great deal of experience. A very valuable experience, however, is gained by allowing the boys to experiment.

Stuffing the Stool

As the work progresses, it becomes necessary to stuff the space between the layers of cord. Raffia, paper, rushes, or even excelsior are used to make a firm, solid seat. This stuffing must be well done in order to prevent breaking at the inner edges of the rails. When the wrapping and stuffing are completed and the frame placed, the cord should be given a couple of coats of shellac. Sometimes varnish

is used. Care should be taken when shellacing that all the strands are forced into place. The shellac or varnish will aid in keeping a perfectly smooth surface, and is a protection against moisture. If so desired, a coat of stain may be applied before using the shellac. This is especially desirable when the seat is to be of the same color or a tint of the same color as the frame of the chair. In a recent display of furniture, in which the combination of materials was emphasized, rush seated stools were shown on which paint had been used.

Fig. 167 shows a partially wrapped top.

Fig. 171 shows the working drawing of the stool.

To Place the Frame

Remove the caps at the corners and screw the frame to the posts of the stool. When this is done the caps are again returned to the corners, and with glue and brads are tacked permanently to the corners. The return of the caps covers the screw heads used to keep the frame in place.

Fig. 169 shows the finished stool.

Fig. 170 shows a square seat, the wrapping having been done over the rails of the stool.

Fig. 168 shows the working drawing of the stool shown in Fig. 170.

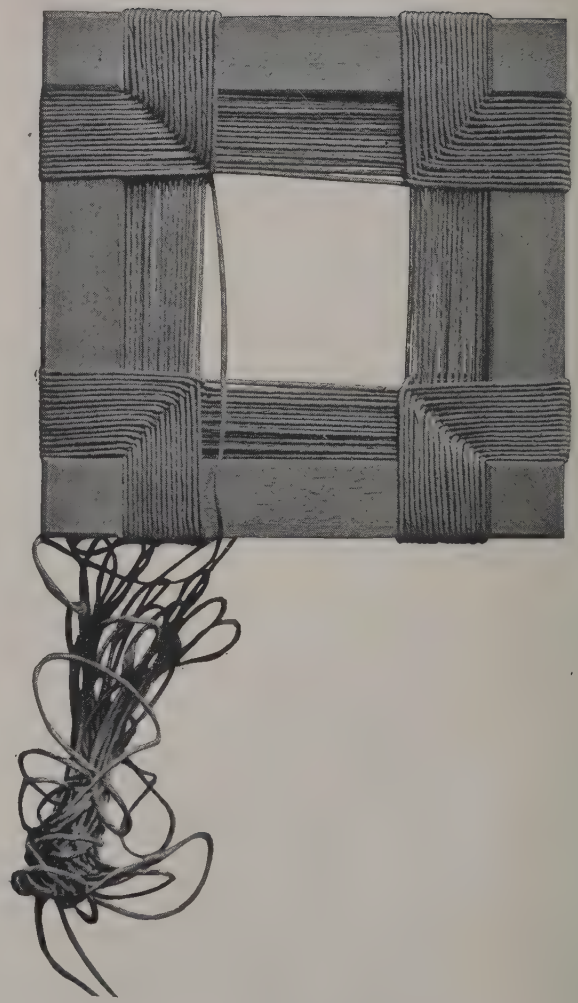


Fig. 167—Partially Wrapped Top

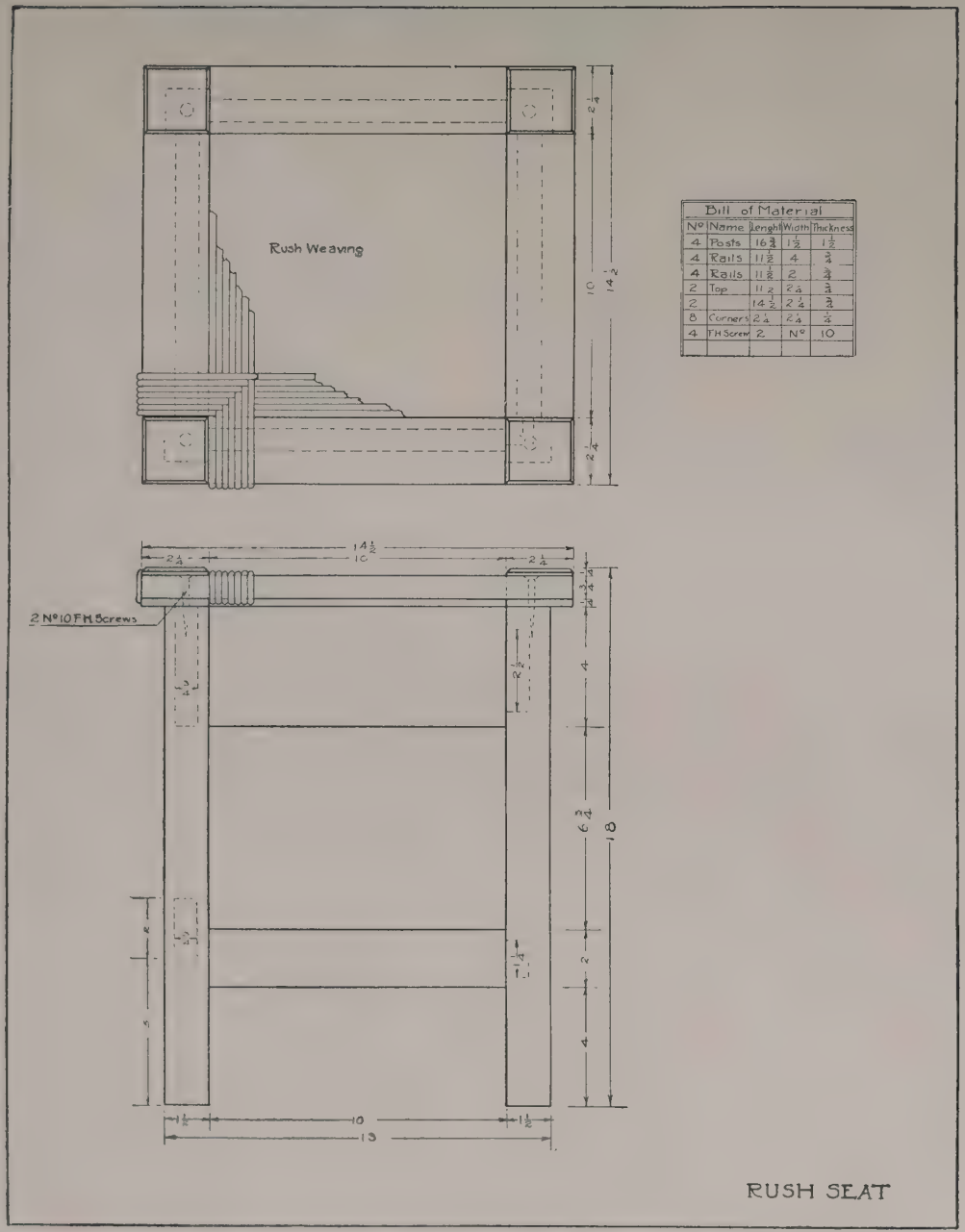


Fig. 168—Working Drawing of Rush Seat (Eighth Grade)

Wrapping a Rectangular Seat

It is not absolutely necessary that the wrapping be done over a separate frame and then inserted or screwed to the posts, as in the case of the stool above described and shown in Fig. 169.

The wrapping is more often done over the rails of the chair or stool, as shown in Fig. 170. This is somewhat more inconvenient than wrapping over a frame. Wrapping over the rails of the chair does away with two plain squares in each corner, as must

Fig. 169—Rush Seat

Fig. 170—Square Stool

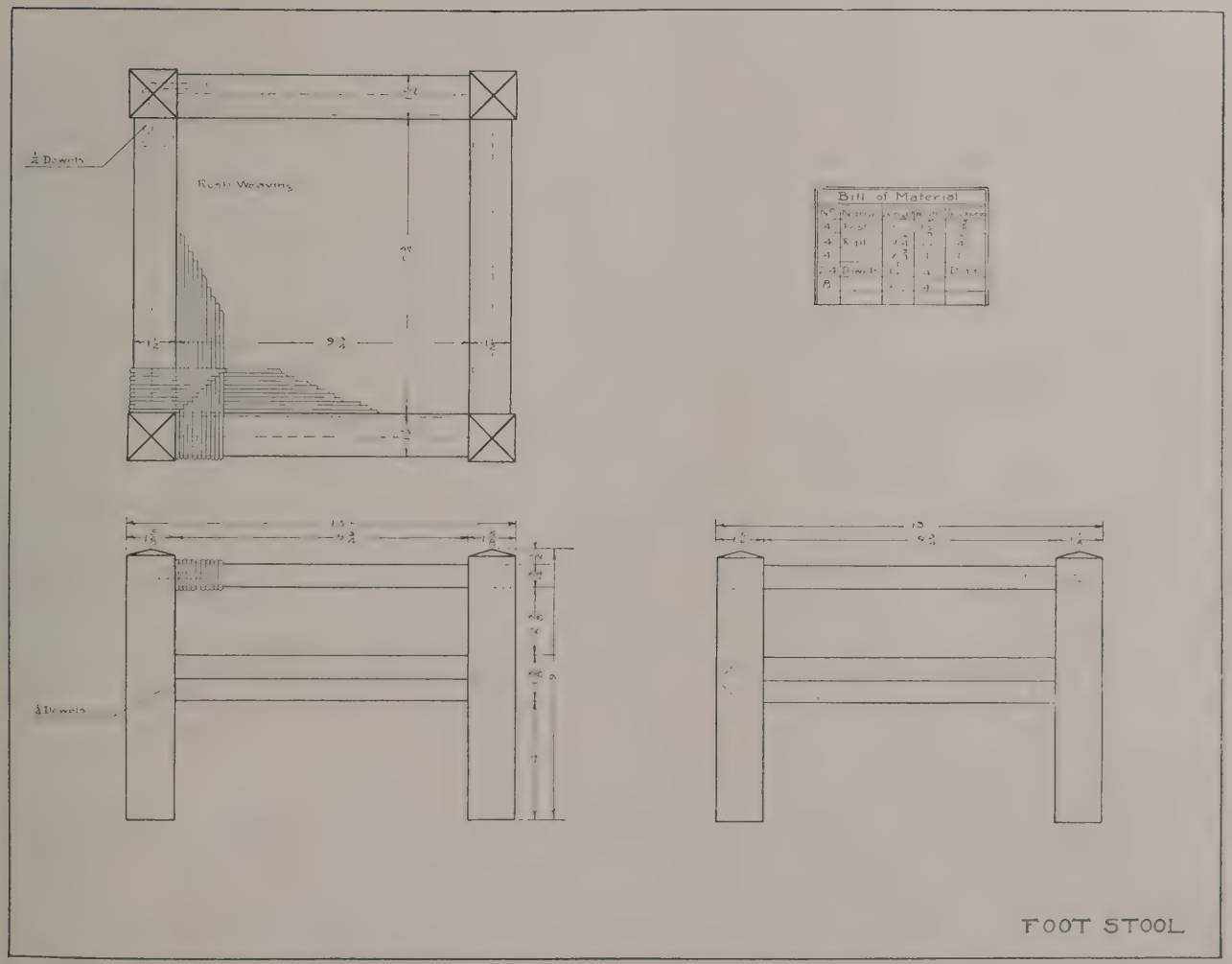


Fig. 171—Working Drawing of Foot Stool (Eighth Grade)

be true when using the frame, the post of the chair or stool making one square and the cap at each corner of the frame making the other.

In wrapping a rectangular seat, proceed the same as when wrapping the square, as shown in Fig. 166.

In Fig. 172 is shown a partially wrapped rectangular stool top. It shows the short rails already filled while there is considerable vacant space to be filled on the long rails. The weaving around the corners is no longer possible. The problem is to fill the vacant space on the long rails. This is accomplished by going over and under a long rail, across half the frame opening, which is very definitely shown in Fig. 172, up through the center opening, across the remaining half, and over and under the other long rail. This is continued until the seat is finished. Fig. 173 shows the finished stool and Fig. 174 shows the working drawing of the stool.

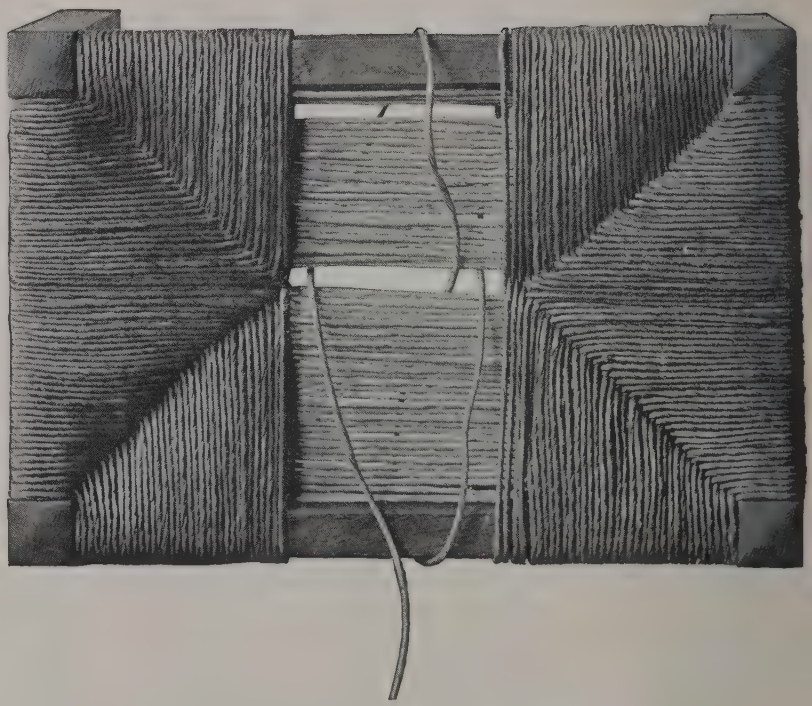


Fig. 172—Partially Wrapped Rectangular Top

Rush Seating an Irregular Seat

In the foregoing directions, only the regular shapes, the square and rectangular, have been considered. In order that the boy may become familiar with shapes other than those above mentioned, the one shown in Fig. 175 is introduced. This shape is often seen in the commercial market. The drawing

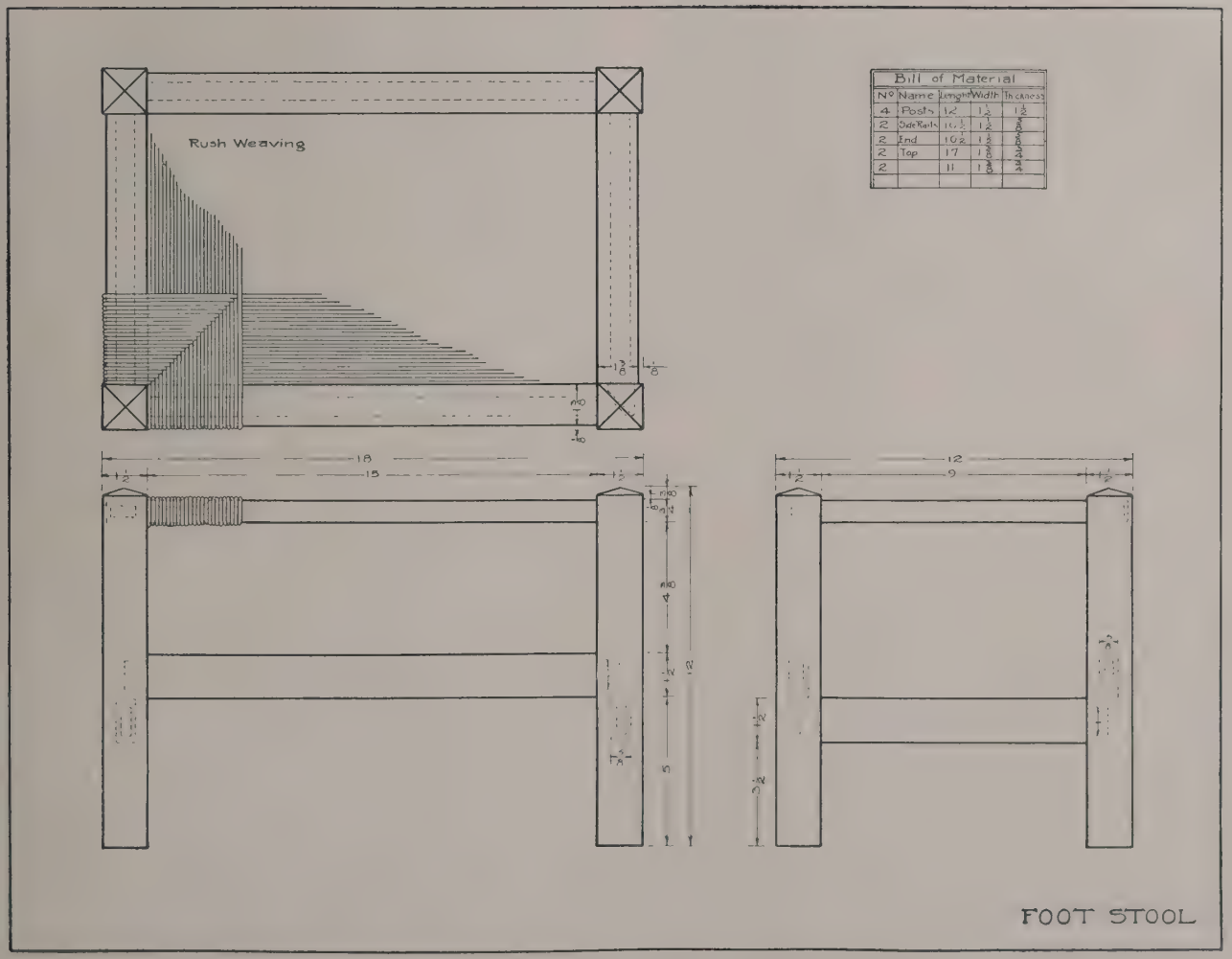


Fig. 174—Working Drawing of Foot Stool (Eighth Grade)

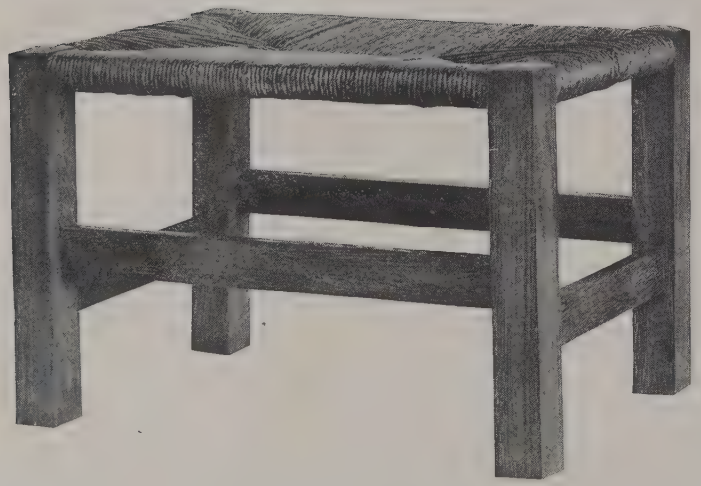
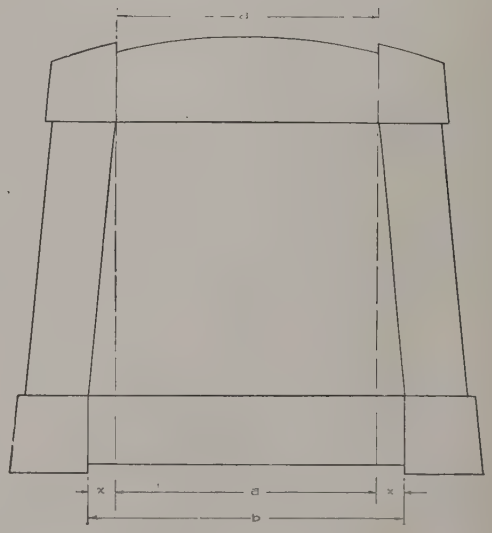


Fig. 173—Rectangular Stool

in Fig. 175 clearly shows that the front rail is longer than the back and that the side rails are equal in length.

The first step in the seating of this shape is to mark off a distance on the front rail equal in length to the back rail. This is done by placing one arm of the framing square along the long edge and the other arm butting against the inner edge of the cap on the short rail, and drawing the lines on the longer rail, as shown in Fig. 175.

This is a sort of squaring-up process, marking off or describing a perfect rectangle in the center. If the framing square is not at hand, the squaring-up may be done by subtracting the length of the short or back edge between the caps, from the length of the long or front edge between the caps, and one-half of this difference marked off on the long rail, measuring from the inner edges of the corner caps, as shown in Fig. 175.



X=½ Difference between a and b

Fig. 175—Method of Marking Irregular Frame

In the wrapping, the first step is to fill in the space at the side not a part of the rectangle. There are two ways of doing this. In the first, take a strand of cord, tie a string to the end. Tie this string around the back rail close to the left hand cap. Then proceed as when weaving a square until the back rail is reached. Cut the strand about 2 in. from the back rail and tie a string to the cut end. This string in turn is wrapped around the back rail close to the right hand cap. Proceed in this way until the spaces marked off on the front rail are filled. There is now a perfect rectangle, which may be wrapped as previously described.

Another good way of filling in the extra space at the front corners is to tack one end of a strand to the inner edge of one side rail close to the corner. Wrap the cord around the corners, as shown in Fig. 176, and tack the other end to the inner edge of the opposite rail. Proceed in this way until the spaces on the front rail are filled. There is now a rectangular space, which is wrapped as already described.

The seating of irregular seats is no more difficult than that of the square or rectangle. Any eighth-grade boy can do the work if the fiber cord is used. The twisting of the genuine rush is somewhat difficult.

Fig. 177 shows a finished irregular seat.

Fig. 178 gives the working drawing for a rush seated chair.

Fig. 179 shows the top of a stool woven with fiber cord.

Fig. 180 shows a finished stool.

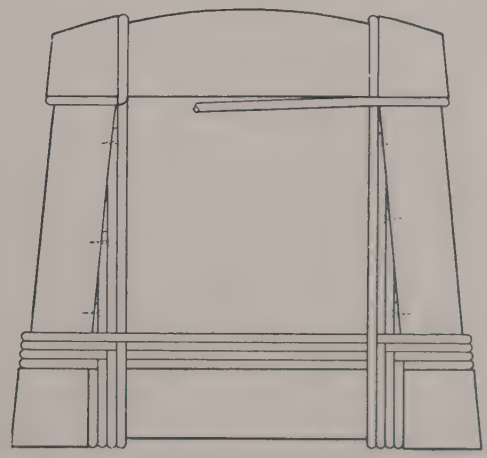


Fig. 176—Method of Wrapping an Irregular Frame

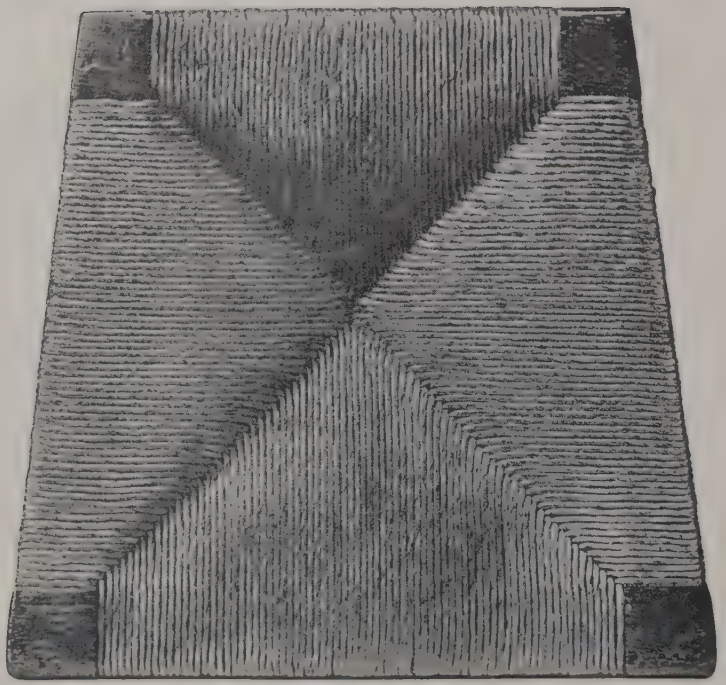


Fig. 177—Irregular Shaped Seat

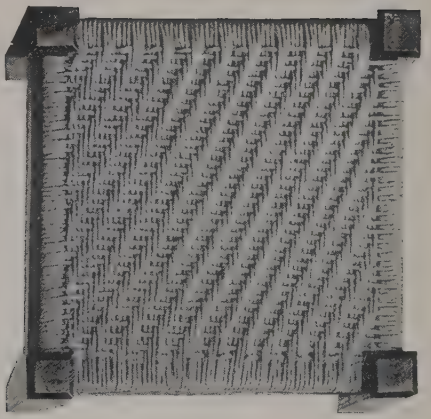


Fig. 179—Woven Top

Fig. 180—Stool with Woven Seat

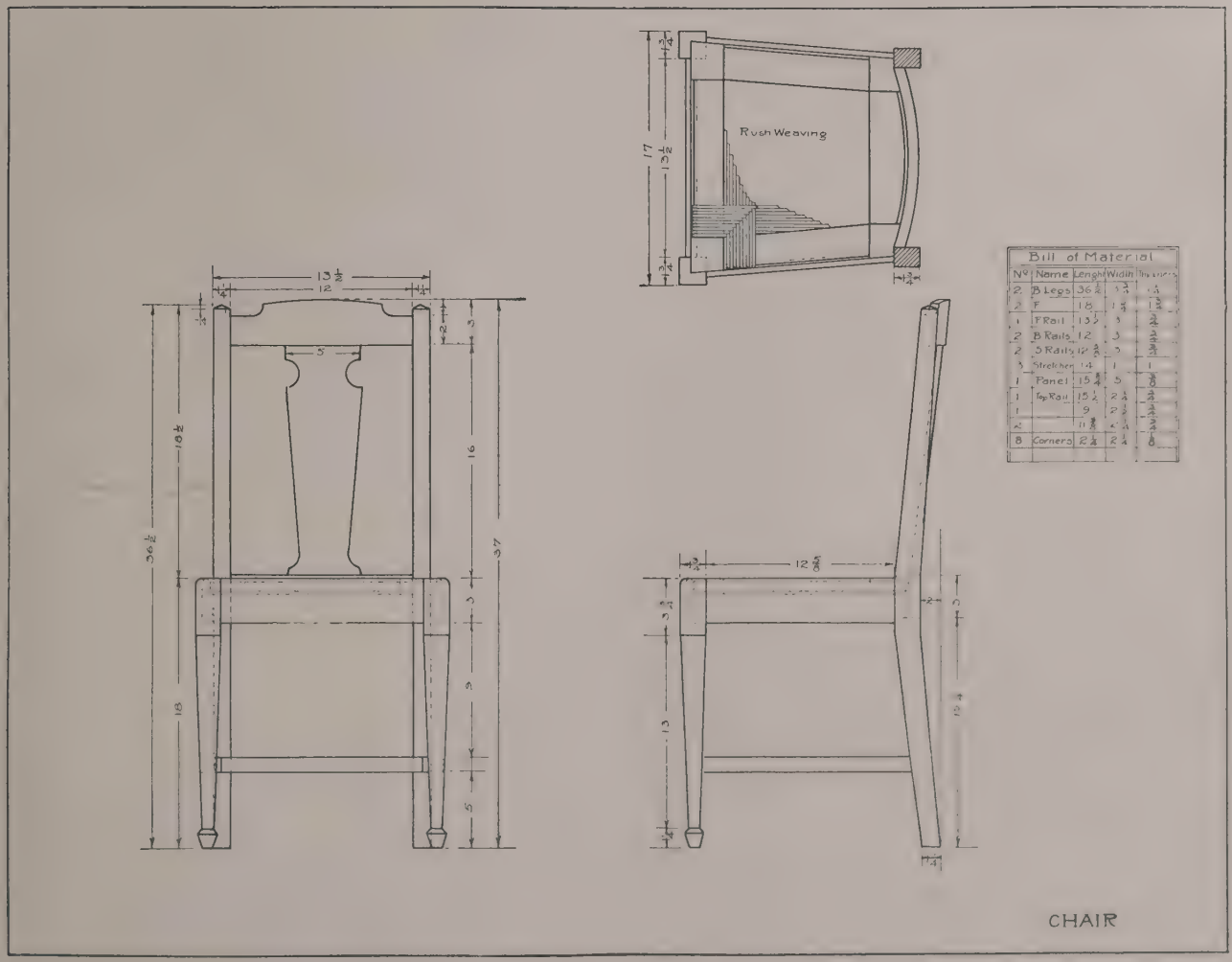


Fig. 178—Working Drawing of Chair (Eighth Grade)

CHAPTER VII

Hickory Splints

Hickory splints are the product of the hickory tree, obtained in very much the same way as are splints from the black ash and the oak trees.

Many of the old colonial hickory-splint-seated chairs are still to be seen in the various museums in the New England and Middle Atlantic states. The chairs to be seen at Deerfield, Mass., are especially interesting. The hickory splint seated chairs, as household furniture, may still be found in everyday use in various sections of the country, especially in the south.

Since civilized man has learned the value of fresh air, the inevitable demand for suitable outdoor furniture has been created. After much experimenting with various kinds of wood, it was found that hickory, because of its toughness and pliability, was the most suitable of all native woods. It stands all kinds of weather with placid indifference. It may be used in its natural state without paint or varnish, —the beautiful sheen and soft colorings of the smooth bark being infinitely prettier than any paint or varnish.

The Splints

The splints are usually furnished in two widths, one about $\frac{3}{8}$ in. wide, and the other about $\frac{5}{8}$ in. Splints of this kind may be purchased from the original producer at about twenty cents per pound. Several of the largest rustic furniture companies use splints made of the inner bark of the hickory for the backs and seats of porch furniture. These splints are somewhat darker in color than those obtained from the trunk of the tree.

The frame work need not necessarily be of hickory. Sassafras wood is very often used,—in fact, branches of any kind of trees may be used. Hickory and sassafras retain their bark, while the branches from many local trees will not. Encourage the pupils to bring in branches trimmed from these trees during the season for trimming.

Fig. 181 shows the working drawing of a stool with a woven hickory splint top. The construction of the frame is very simple.

Making a Form

It will be observed that there is a slight curve in the side rails of the stool top. This curve is often natural, but the rails may be easily bent over a form made for this purpose. Such a form may be made of a piece of 2 in. plank by drawing the curve down the

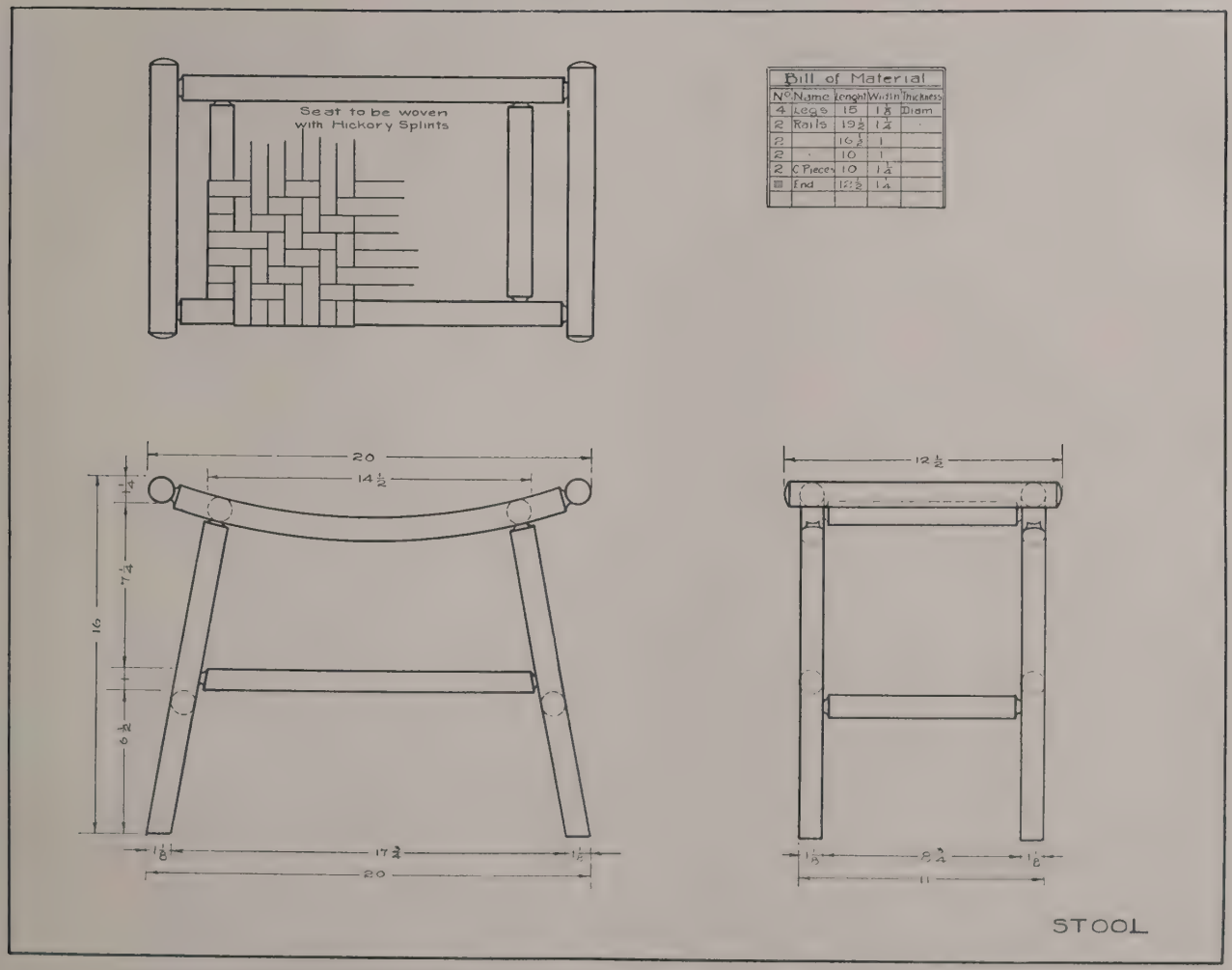


Fig. 181—Working Drawing of Stool (Eighth Grade)

center of the plank and sawing. Place the branch to be bent between the two parts of the form and then draw them together with the clamps. If the wood is green, it will bend without any special treatment; but if dried out, it must either be steamed or soaked in boiling water. Such pieces must remain clamped in the form until thoroughly dried out; otherwise they will spring back to their original shape.

Fitting the Tenon

Care should be taken, however, when fitting the rails, not to taper the tenons. This mistake is often made, and the result is insufficient space for the glue to hold the parts together. The final outcome is that the frame comes apart in a short time.

Fig. 182 shows the wrong way of cutting the tenon, while Fig. 183 shows the right way.

Weaving the Top

To weave the top, the splints are soaked for a short time in water. This makes them very pliable and easily handled.

To begin the seating, tack one end of a splint to one of the rails of the top, using a 2 oz. iron tack. The splint is wrapped around the seat frame. When

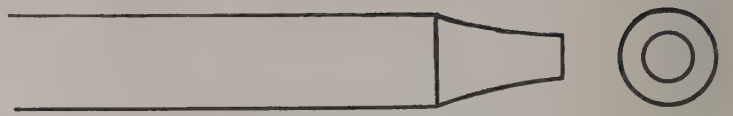


Fig. 182—Incorrect Way of Cutting Tenon

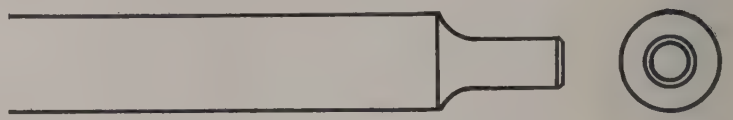


Fig. 183—Correct Way of Cutting Tenon

the end is reached, it is fastened with a tack. The end of a new splint butts up against the end of the one just used, and the wrapping is continued until the entire top is covered. Wrapping in this way makes a double seat. Fig. 184 shows the wrapping.

Weaving

The wrapping completed, the weaving is begun about the middle of the under side of the seat. In this exercise, both the top and the under side of the top are woven. This is true of all hickory splint and flat reed weaving of stool tops. If plain weaving is to be used, the weaver simply passes over one and under one.

If a diaganol weave is desired, the same directions may be followed as given for ash splints. When the end of one splint is reached, the beginning

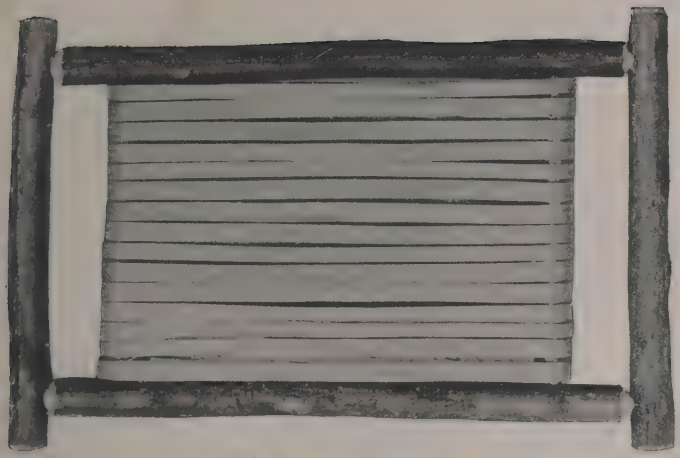


Fig. 184—Wrapping

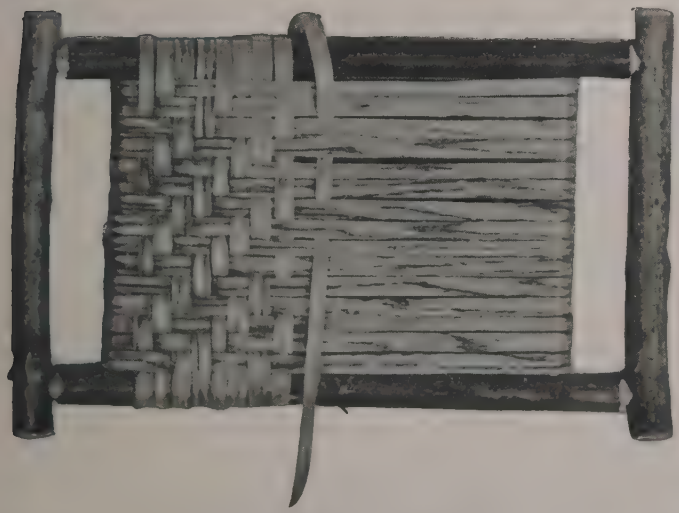


Fig. 185—Partially Woven Top

of the second weave overlaps the end of the first for a couple of inches, and the weaving continues the same as at first. It is desirable to have the overlapping come on the under side of the stool top. Fig. 185 shows a partially woven stool top. Fig. 186 shows the completed stool. This work may be made most attractive and inexpensive for the boys in making garden and porch furniture.

Fig. 186—Stool with Woven Top

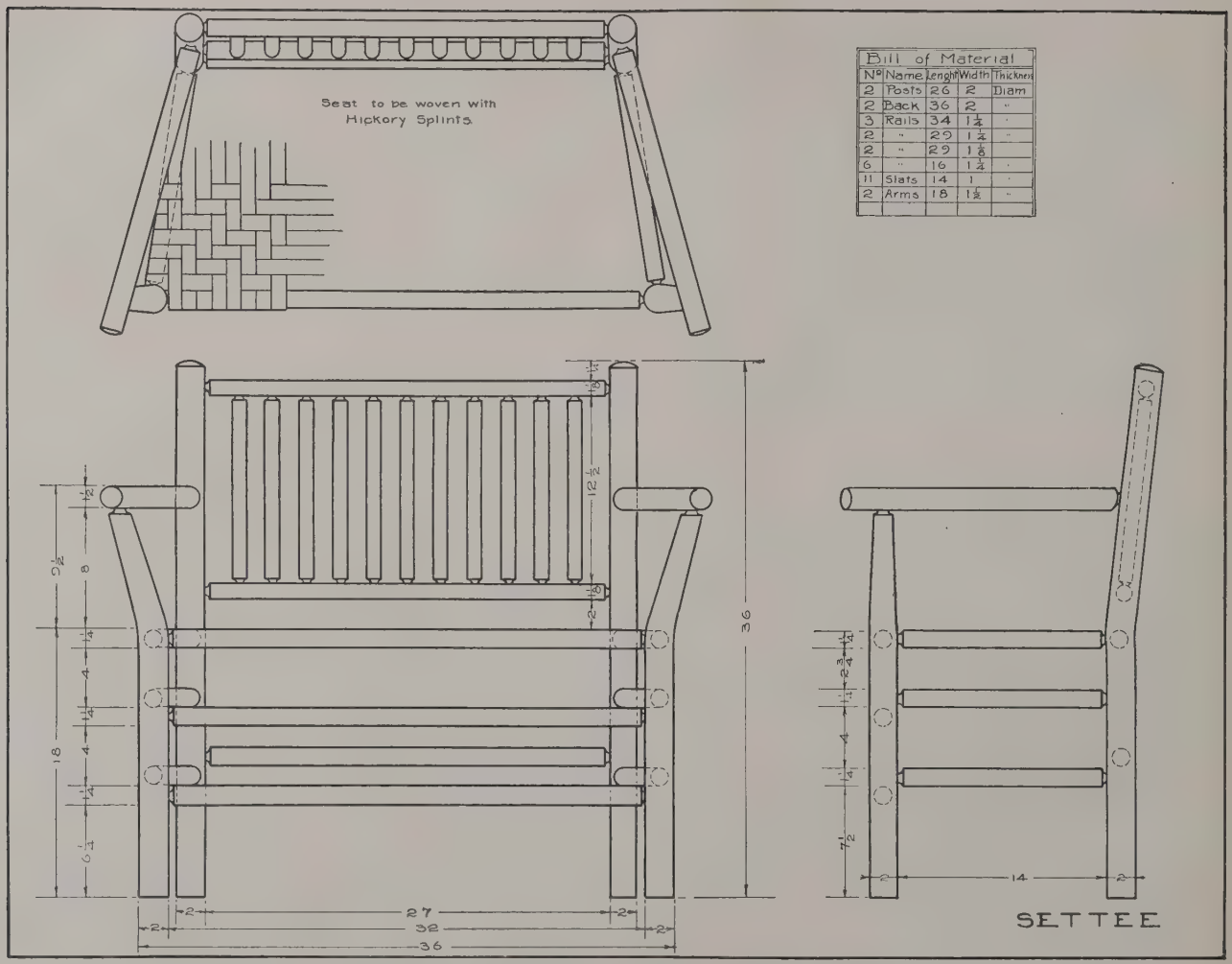


Fig. 187—Working Drawing of Settee (Eighth Grade)

Fig. 187 shows the working drawing of a porch settee with woven seat and long, straight branches for the back.

Fig. 188 shows the finished settee with woven seat.

In Fig. 189 is shown the working drawing of a porch chair with woven seat and back.

Fig. 188—Settee. Woven Seat.

Fig. 190—Chair. Woven Seat and Back

Fig. 190 shows the finished chair.

Fig. 191 shows the working drawing of a settee with woven seat and back.

Fig. 192 shows the finished settee.

Fig. 193 shows a settee with a woven seat and two woven panels in the back.

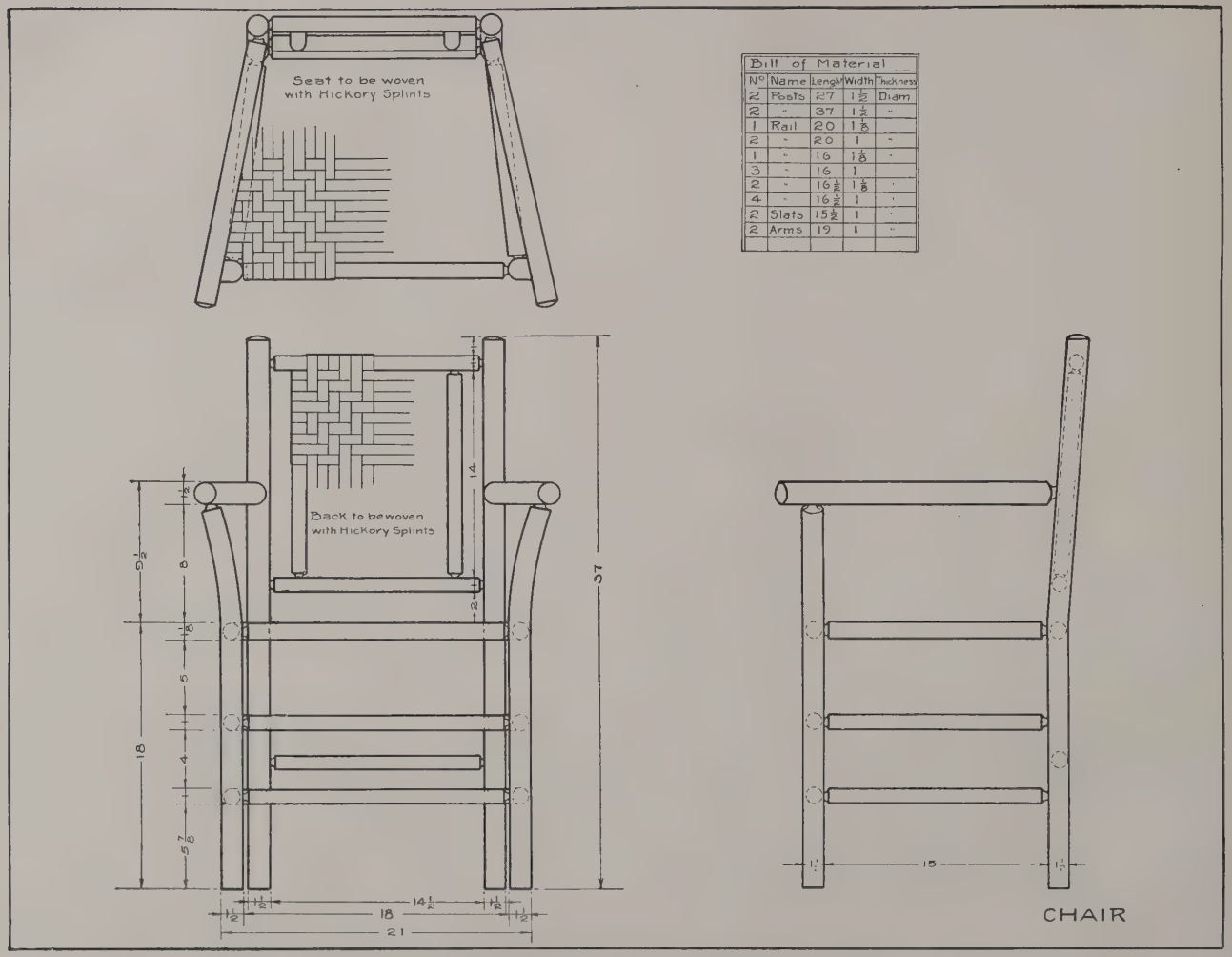


Fig. 189—Working Drawing of Chair (Eighth Grade)

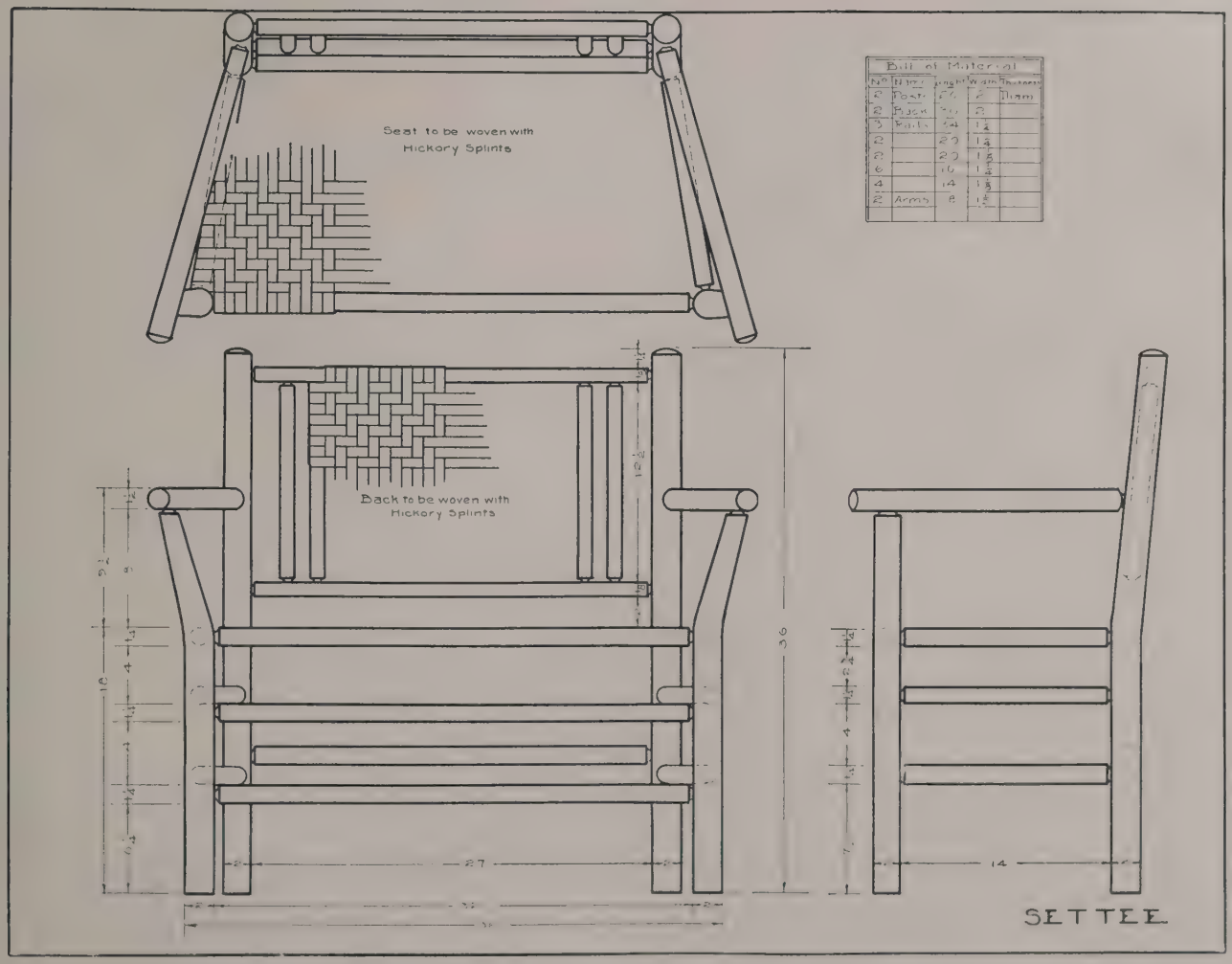


Fig. 191—Working Drawing of Settee (Eighth Grade)

Fig. 192—Settee. Woven Seat and Back

Fig. 193—Settee. Woven Seat and Two Panels in Back

CHAPTER VIII

Simple Upholstering

We may safely say that 75 per cent of the furniture manufactured today is upholstered in one form or another, the reason being not only for the ease and comfort that are produced, but because of the beautiful and artistic effects that can be obtained by upholstering. Upholstering is an art in itself, and like most arts, cannot be poorly done without a displeasing effect on the entire article upon which it is applied.

The methods of upholstering are too numerous to mention in full, therefore we shall explain only those simple methods that are within the capabilities of the average seventh- or eighth-grade boy. The tools needed for these simple methods are very few. The materials that may be used, and that are used the most, are webbing, springs, canvas, cotton, curled hair, common tacks, upholstering tacks, staples, gimp, cord, leather, imitation leather, tapestry, and fabrics of all kinds.

The most simple of all upholstering is the stretching of leather over a plain surface such as the top of a library table, leg rest, or footstool, where only the effect of the upholstering is desired. This is very good for library tables, but not for leg rests and foot-stools, where a little comfort must be considered. This method can be used on leg rests and foot-stools if a small amount of curled hair is placed under the leather before stretching it, as in the case of the leg rest shown in Fig. 157.

Do not use cotton when upholstering over a plain, hard surface, such as the top of the leg rest, as the cotton will pack down and in time become almost as hard as the wood itself. Curled hair will not pack as readily nor as hard as cotton. But when curled hair is used, a thin layer of cotton should be placed over the curled hair before stretching the leather over it.

The next method is that in which the webbing is used as a base upon which the upholstering is built. The use of the webbing adds greatly to the comfort of the article to be upholstered, in this case a small foot-stool. At A, Fig. 194, the foot-stool is shown with the webbing stretched and tacked upon it. The webbing must be pulled very tight and tacked very securely, the ends of the webbing being doubled to insure a good hold for the tacks.

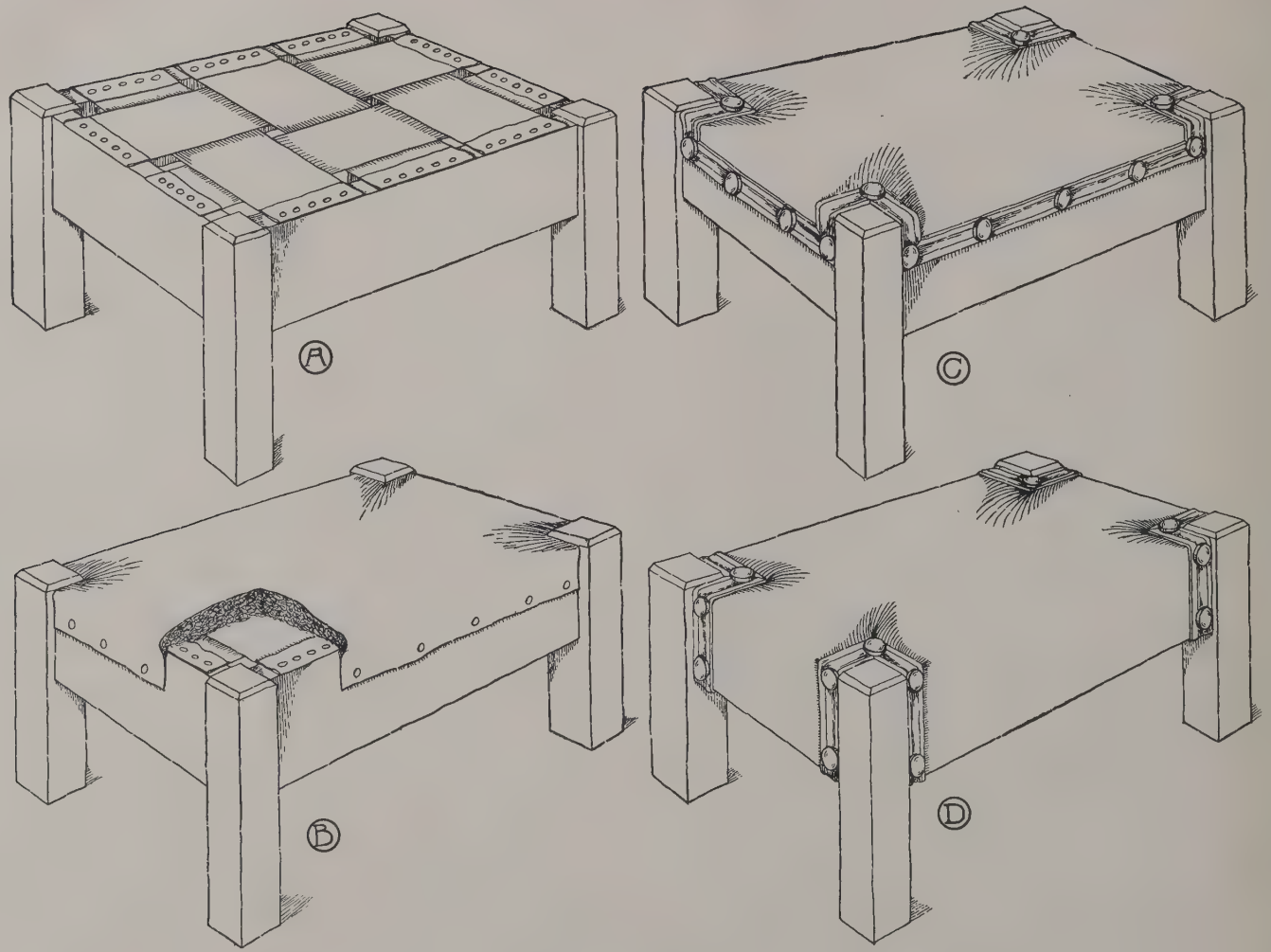


Fig. 194—Steps in Upholstering a Small Foot Stool

In B, Fig. 194, is shown the leather stretched and tacked to the stool over the curled hair and cotton, which has been placed on the webbing. In placing the leather on the stool it should be stretched from corner to corner first and tacked temporarily, then pulled from center to center, right and left, front and back, and tacked securely at the center. Then proceed with the tacking down of the leather from center to corner, always pulling the leather down and towards the corner. When the corner is reached, remove the tack placed there in the beginning, trim the leather to fit snugly around the post, then pull it tight and tack it securely, seeing that there are no wrinkles in the leather before tacking.

If there are any wrinkles they can be filled out with cotton.

When the leather has been stretched and tacked as shown in B, Fig. 194, we may next place the gimp around the edge of the leather and tack it with upholstering tacks as shown in C, Fig. 194. This gimp not only adds greatly to the beauty of the upholstering, but also covers up any defects in the stretching of the leather.

If the rails are not too wide, and the piece of leather is large enough, one might stretch the leather around the rails and tack it on the under side of them, as shown in D, Fig. 194.

If the leather is pulled snugly and neatly around the posts no gimp is necessary, but if not, the defects may be covered by placing the gimp around the posts as shown in D, Fig. 194. It may be said here that small corner blocks should be placed in each corner of the foot-stool to provide a place for the upholstering tacks. The gimp and tacks give the upholstering a finished appearance.

The foregoing methods of upholstering may be used on any piece of furniture, provided the opening is not too large.

We now come to another simple method, which is used very extensively in upholstering the seats of dining-room chairs, and which may also be used very effectively on any chair or stool.

It is necessary first to make a wooden frame 1 in. thick and the same shape as the opening in the chair which it is to cover, but $\frac{1}{2}$ in. larger all around than the opening. Then rabbet each edge and cut each corner out on the under side as shown in Fig. 195, so that the frame will slip down into the opening with the $\frac{1}{2}$ in. projection all around. This projection is about $\frac{1}{4}$ in. in thickness. Then round off the edges of the frame on the upper side as shown in Fig. 196. Corner blocks are now placed in each corner of the chair or stool so that the frame rests on the blocks, and the projections of the frame rest on the rails. This removes any pressure from the pro-

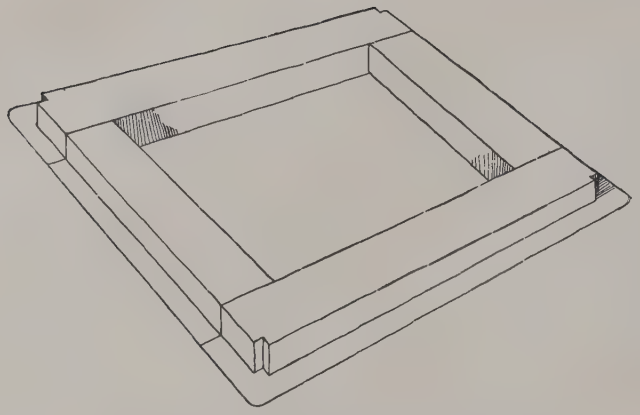


Fig. 195—Under Side of Slip Seat Frame

jection. If these blocks were not placed beneath the frame the projections would snap off when the first real pressure was placed upon the seat.

The next operation is to upholster the frame. Tack the webbing on as in the case of the foot-stool, pulling the webbing tightly before tacking. Weave the webbing over and under as shown in Fig. 196.

Now place the cotton on the frame and then tightly stretch the leather over it, tacking the leather on the under side of the projections. Do not use too much padding, as the seat will become bulk-some; yet have enough to make the seat comfortable, as shown in Fig. 197. The seat may be held in place by placing a screw up through each corner block and screwing it into the seat frame.

The other method of fitting the seat frame to the opening in the chair is to rabbet out the rails and posts to fit the frame, but this method is a little too difficult for an eighth-grade boy to accomplish.

The methods described in the foregoing paragraphs suit very well the articles mentioned in the explanation of the methods. But, one expects more comfort in a Morris chair than in a dining-room chair, therefore one must use a method of upholster-

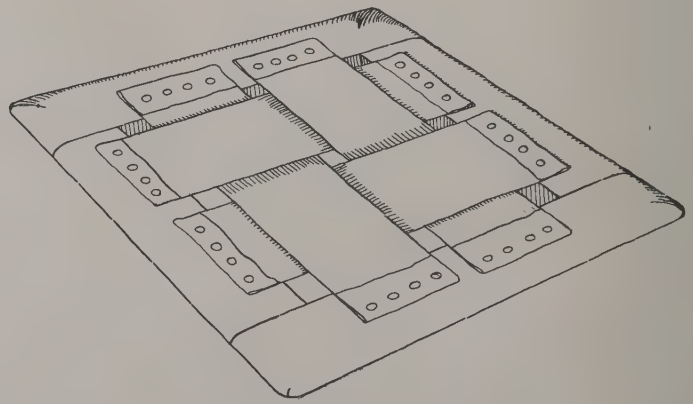


Fig. 196—Webbing Tacked on Frame

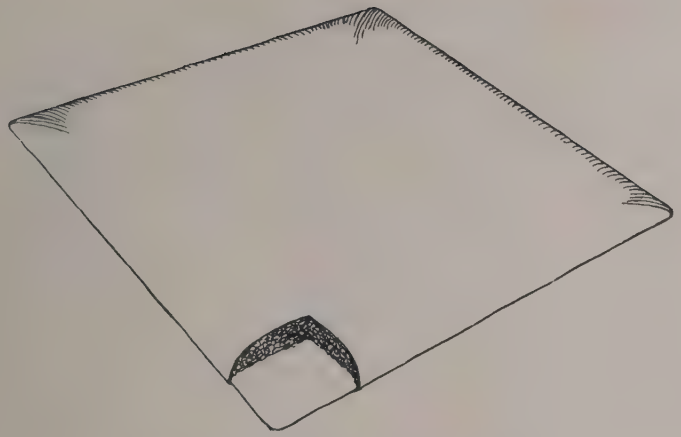


Fig. 197—Leather Stretched on Frame

ing Morris chairs, rockers, etc., that will give greater comfort. There are a great number of methods of doing this. We shall take the easiest and simplest.

To begin with, one must make a box frame, as shown in Fig. 198, which is ½ in. shorter than the distance between the front and back *rails*, and ½ in. narrower than the distance between the right and left *posts* of the chair in which the cushion is to be placed. The box is made of ¾ in. stock about 4 in. high. Along the inner lower edges of the front and back ¾ in. square strips are screwed to the box as shown in Fig. 198, and on these are placed the 4-in. strips of wood upon which the springs are tacked.

Fig. 199 shows the springs held in place by ¾ in. staples, a small piece of rope about 1 in. long being placed between the spring and staple before the staple is hammered down. After the springs are made fast at the bottom, they are tied together with rope at the top as shown in Fig. 199. Take a piece of rope about 4 in. longer than the box and tie one end of it to one side of the upper rim of a corner spring, cross over to the other side of the rim, tie a single knot, pass over to the next spring, repeat the opera-

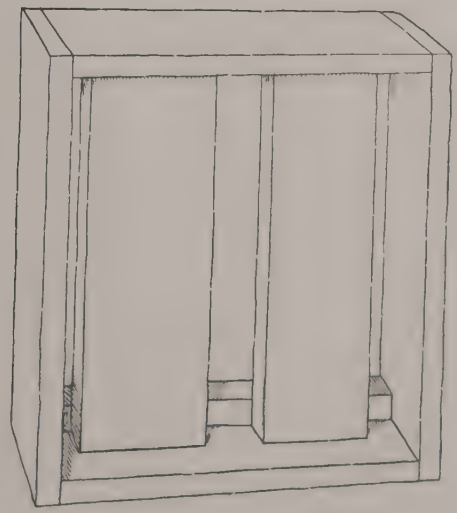


Fig. 198—Box Frame

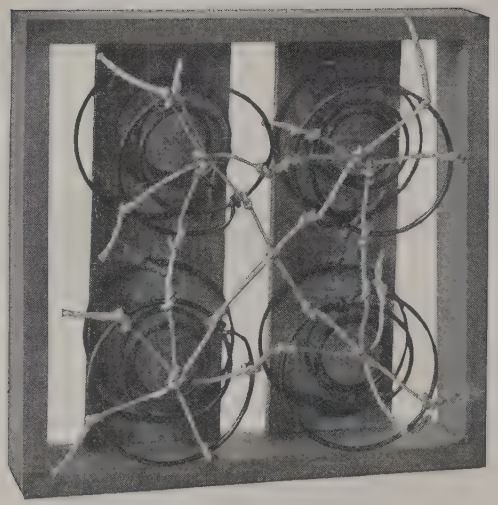


Fig. 199—Springs Tied and in Place

tions performed on the first spring, and let the end of the cord hang over the side of the box. Repeat this operation until you have six strands of cord tied over the springs as shown in Fig. 199, two ends on each side and one in each corner. When you have this completed pull the ropes tight and tack the ends to the upper edges of the box. This secures the springs at the top.

The springs may be covered with webbing as shown in Fig. 200, or with a piece of canvas. The cotton is then placed upon the springs, allowing it to cover the sides of the box frame as shown in Fig. 201.

The leather is then stretched over the cotton and tacked on the under side of the box, stretching the leather as in the case of the foot-stool, that is from corner to corner first, and then from center to center. A piece of canvas is then tacked over the bottom of the box and the cushion, as it is now called, is complete, Fig. 201.

One must decide for oneself just how many springs are to be used in a cushion. The fewer

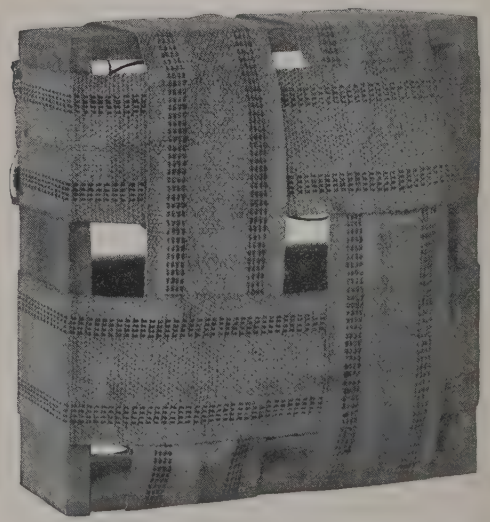


Fig. 200—Springs Covered with Webbing

the springs the softer a cushion, while the more springs used the more serviceable a cushion.

The methods of upholstering described in this chapter are only a few of a great many, but they will suffice all purposes for which upholstering can be used in the sixth, seventh, and eighth grades.

Fig. 201—Leather Stretched Over Box

CHAPTER IX

Round and Flat Reed Weaving

The purpose of this chapter is to show a few of the possibilities that may be accomplished in round and flat reed, and to point out the relation reed bears to wood. Too many manual training teachers are laboring under the impression that elementary manual training concerns work in wood only. It has already been stated in a previous chapter that the one great aim of manual training is to combine judgment, a purely mental function, and execution, a purely physical function. There seems to be no work in which the two can be combined so efficiently from the beginning, as basketry. The expression of thought through wood and many other mediums requires, very often, an elaborate equipment of tools. The work in basketry requires almost no tools, and yet offers great variety as to form and color, and almost unlimited possibilities in design.

Much of the poor work in reed is often due to poor teaching, and many times in attempting problems too difficult.

For the purpose of experimenting, take a 10 in. square of 2 in. plank. From the center describe a 9 in. circle. On the circumference, mark off and bore $\frac{1}{8}$ in. holes from $\frac{5}{8}$ in. to $\frac{3}{4}$ in. apart. There should be an uneven number of holes. In order to bring this about it would be better not to keep the spacing equal. When an even number of stakes are to be used, a plug may be placed in one of the holes.

With the above device at hand it is possible for the pupils to answer many questions which arise concerning an odd or an even number of spokes. Such a device also gives the teacher an opportunity of demonstrating the single, double, triple, and quadruple weaves.

Single Weaving

Fig. 202 shows the single weave with an odd number of stakes.

Fig. 203 shows the single weave with an even number of stakes. In this weave it will be observed that after the weave has passed around once, it no longer continues to pass before and back of the

Fig. 202

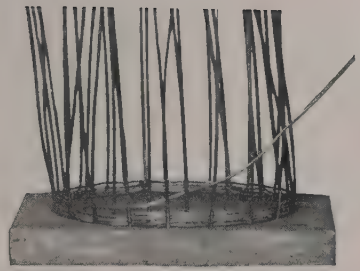


Fig. 203

Fig. 204

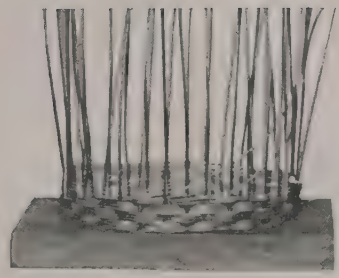


Fig. 205

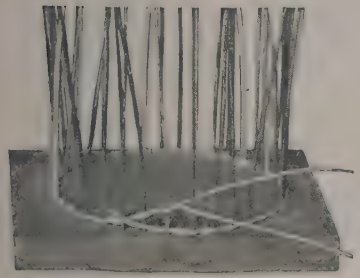


Fig. 206

Fig. 207

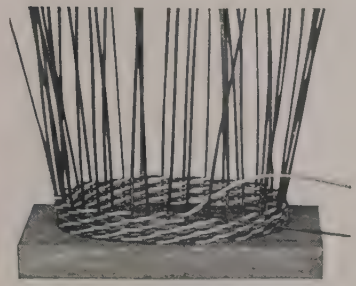


Fig. 208

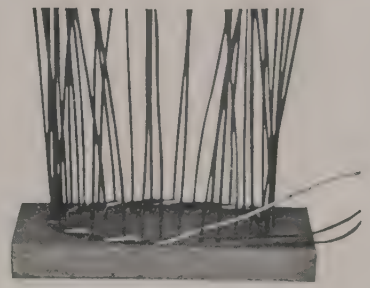


Fig. 209

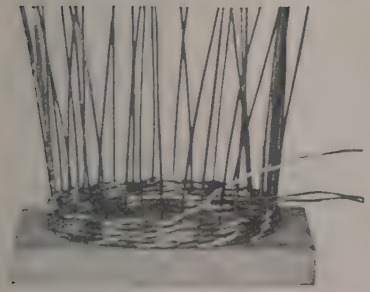


Fig. 210

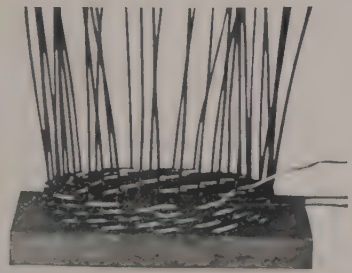


Fig. 211

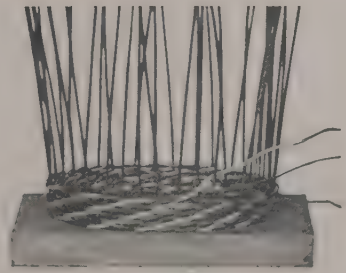


Fig. 212

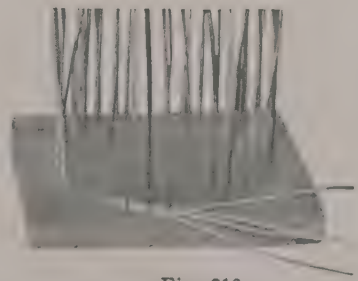


Fig. 213

alternate stakes, but continues to pass before and back of the same stakes, as in the first time around, as shown in Fig. 203.

In order to bring about the passing back and before the alternate stakes, it becomes necessary for the weaver to pass back of two stakes each time around, as shown in Fig. 204. From this point the weaving continues the same as when an odd number of stakes is used. This is the Indian way of weaving, and may often be used as a means of decorative work, as shown in Fig. 205. The weaver, in its journey around the basket, passes back and forth before the same stakes until it has passed around several times. When the reverse is desired, the weaver passes back of two stakes as shown in Fig. 205.

Double Weaving

Double weaving is made more effective if reeds of different colors are used.

Fig. 206 shows the double or pairing weave. In weaving with two, three, or four weavers, the left-hand weaver of the group is known as the rear weaver, and the right-hand one as the forward weaver. Ordinarily, weaving is done from the left to the right, except when a special design is desired.

To do double weaving, two weavers are put behind two consecutive stakes and project toward the right. The rear weaver goes over the forward one back of the stake and out between the two stakes. The forward weaver now becomes the rear weaver, and passes over the back of the stake and out between the two stakes.

Fig. 207 suggests the possibilities in decoration when one weaver is colored and an even number of stakes is used.

Fig. 208 shows the design when the double weave is used with an odd number of spokes. To add a new weaver, insert the end behind and beside the end of the one already woven in, and continue the weaving as if the weavers were continuous.

Triple Weaving

In Fig. 209 is shown the starting of the triple weave. The three weavers are put behind three consecutive stakes and extend toward the right. In weaving, the rear one goes over the other two and in front of the two stakes, behind one stake, and out between the next pair of stakes to the right of the forward weaver. The weaver that was in the middle now becomes the rear weaver, and in turn is treated as the other rear one was treated. This is continued as long as the triple weave is desired. In weaving, always be sure to take the rear weaver, and have it come out between the pair of stakes to the right of the forward weaver.

Fig. 210 shows the result when one colored weaver and two uncolored ones are used, and the number of weavers will go an exact number of times into the stakes. By this is meant, the number of stakes must be divisible by the number of weavers. Each color forms a vertical stripe. Using two colored weavers gives the same result, but with a different proportion of color.

In Fig. 211 is given the result when the number of stakes divided by the number of weavers leaves a remainder of one. This produces a spiral effect on the inside and a variegated effect on the outside.

Fig. 212 gives the result when the number of stakes divided by the number of weavers leaves a remainder of two. This produces a spiral effect on the outside with a variegated effect on the inside.

Quadruple Weaving

Fig. 213 shows the starting of the quadruple weave. This may be done with most pleasing effect in using weavers of different colors.

In weaving, the rear one goes over the other three and in front of three stakes, behind one stake, and out between the next pair of stakes to the right of the forward weaver. The weaver that was next to the rear now becomes the rear and the weaving continues as described.

In order to make use of the suggestions given above, it will be necessary to have a simple problem on which to work.

Mats

Mats are always useful, and since they embody all that is found in the bottom of a basket they may well be taken as beginning problems.

Before beginning the work there are a few terms in connection with basketry that should be made a part of the child's vocabulary. The foundation pieces of reed on which a mat or bottom of a basket are woven are known as spokes because they radiate from the center like the spokes of a wheel. After the bottom of a basket is completed and the spokes are turned upward they are called *stakes*. The strands of reed used in weaving in and out of the spokes and stakes are called weavers. Fig. 214 shows a number of woven mats. The one of simplest construction is shown at A, Fig. 214.

The material necessary for this mat consists of four pieces of No. 3 reed, 14 in. long, one piece 8 in. long, and two weavers of No. 2 reed.

Splitting the Spokes

With a No. 14 or 16 darning needle, split two of the 14 in. reeds. To do this first find the center of the reed, and about ½ in. from this point force the point of the needle through the reed.

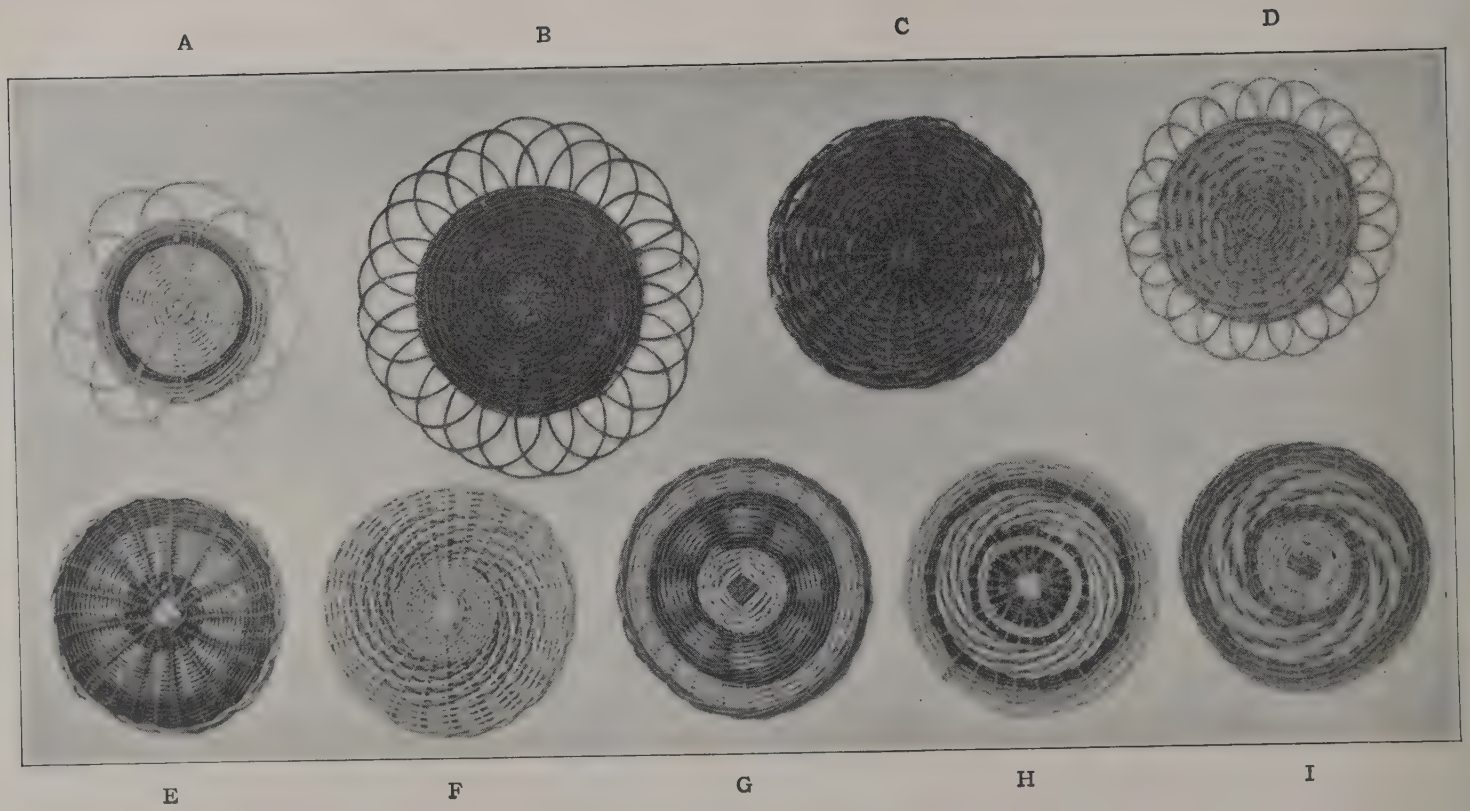


Fig. 214—Reed Woven Mats

Do this by boring, rather than trying to push the needle. When through, pull or push the needle along until a slit about ½ in. long has been made, as shown in Fig. 215. Split a second reed; pass the other two

Fig. 215—Split Reed

14 in. reeds through the splints just made, as shown in Fig. 216. This makes a perpendicular cross. The 8 in. piece is placed between the upper end of the two vertical ones, making an odd number of spokes. By pursuing this method there is very little difficulty in holding the vertical and horizontal reeds together while beginning the weaving.

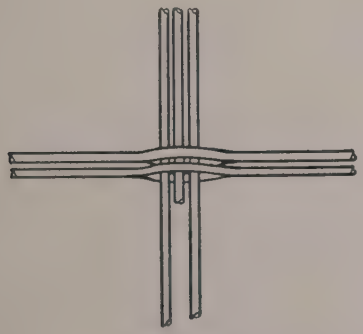


Fig. 216

Beginning the Weave

The weaver of No. 2 reed is placed, as shown in Fig. 217, behind the vertical group and along the top of the horizontal pair with its right hand end projecting about ¾ in. to the right of the vertical group.

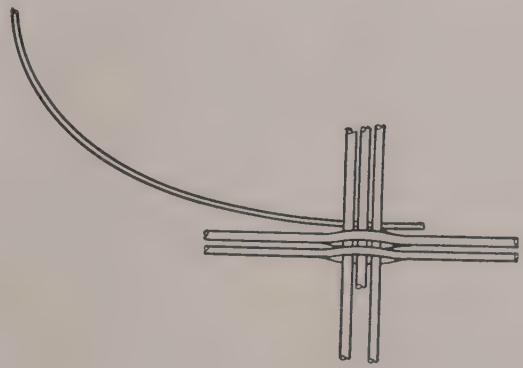


Fig. 217

The weaver is then brought to the right in front of the vertical group, back and down behind the horizontal group, thereby binding its own end to the spokes, Fig. 218.

It next comes to the left in front of the vertical group and behind the horizontal group to the position from which it started. It follows the same

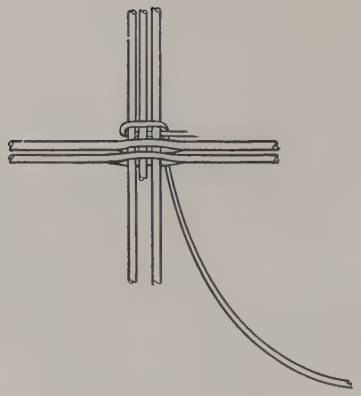


Fig. 218

course for once more around as shown in Fig. 219. The weaving may now be reversed and the weaver allowed to pass over the group it went under the first

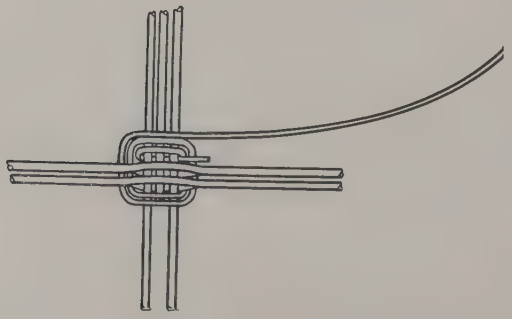


Fig. 219

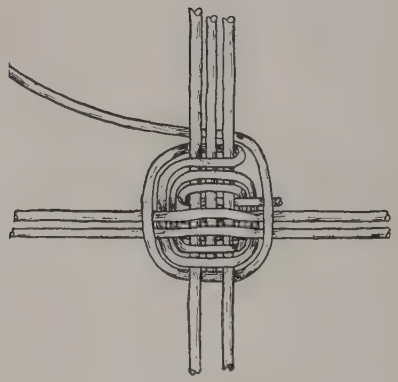


Fig. 220

time around and under the groups it went over, Fig. 220. From this point the weaver begins to pass over and under alternate spokes, Fig. 221.

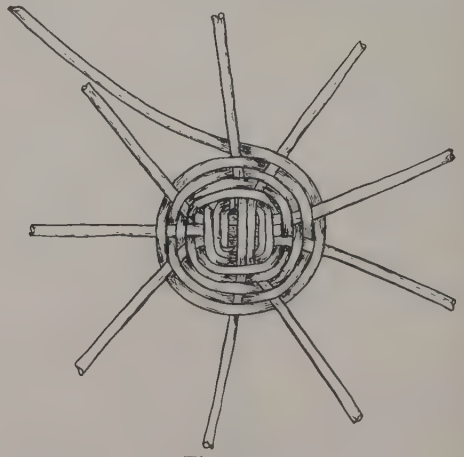


Fig. 221

The left hand does the holding while the right hand does the weaving. When the spokes are all the same distance apart, the mat may be placed on a flat surface and the weaving continued until it is 3 in. in diameter. If one weaver is too short to make the mat of the desired size, add another and join the weavers as shown in Fig. 222.

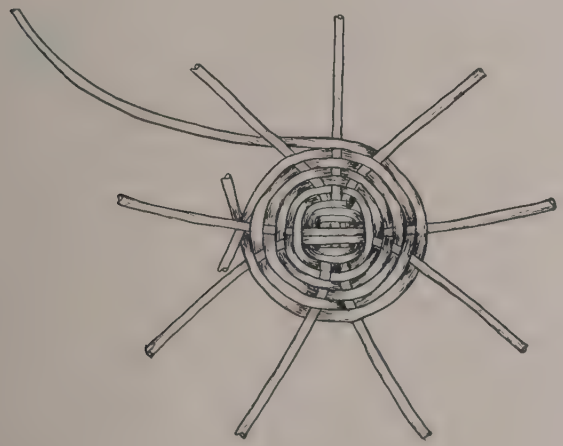


Fig. 222

Be sure to hold the spokes out straight as the weaving is done. It must be understood that the weaver adjusts itself to the spokes and not the spokes to the weaver.

Just as soon as the spokes begin to project in all directions, it is an indication that the workman is attempting to make the spokes adjust themselves to the weaver.

While weaving, hold the work in such a way that the spokes pass between the fingers of the left

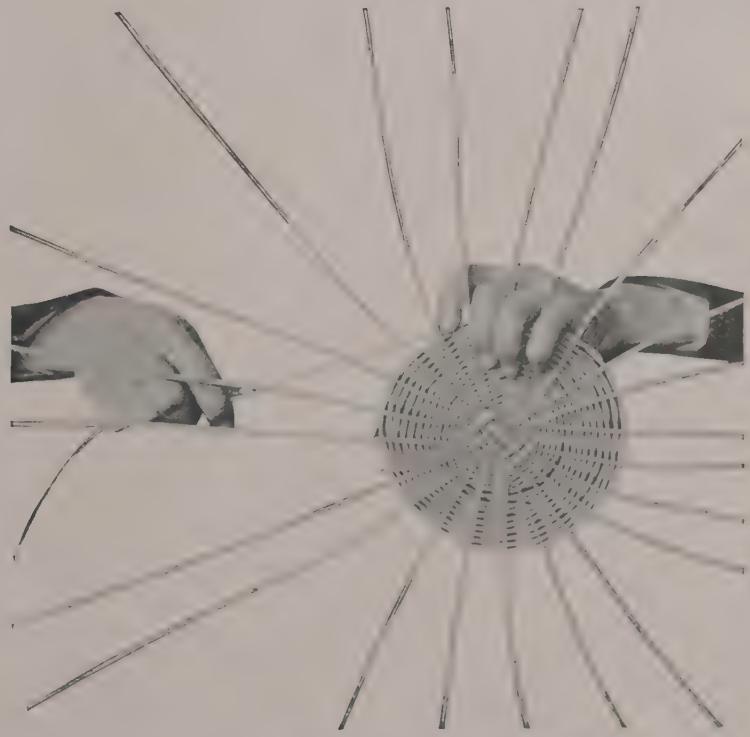


Fig. 223—Correct Method of Holding Work

hand as shown in Fig. 223. The work held in this position makes it possible for the thumb and first finger to hold the weaver in place while the right hand brings the weaver before and behind the spokes.

Tension

If the work is to be kept perfectly flat, care must be taken not to allow the right hand to pull on the weaver while the work is in progress. The right hand, in making a mat, simply carries the weaver before and behind the spokes. If the work begins to pucker and draw up like a bird's nest, it is an indication that the tension is too great.

Over Casting

After the desired diameter has been woven the outer edge must be overcast. Fig. 224 shows one stitch of overcasting and the second stitch ready to be pulled through. This process continues once around, when the weaver is cut off on the back side of the last spoke.

The Border

In Fig. 225 are shown several ways of constructing borders.

In A, Fig. 225, one spoke goes in front of the next and inserts just before it gets to the third. In B, Fig. 225, one stake goes in front of two and inserts just before it gets to the fourth. In C, Fig. 225, one goes in front of three, and in D, one goes in front of four.

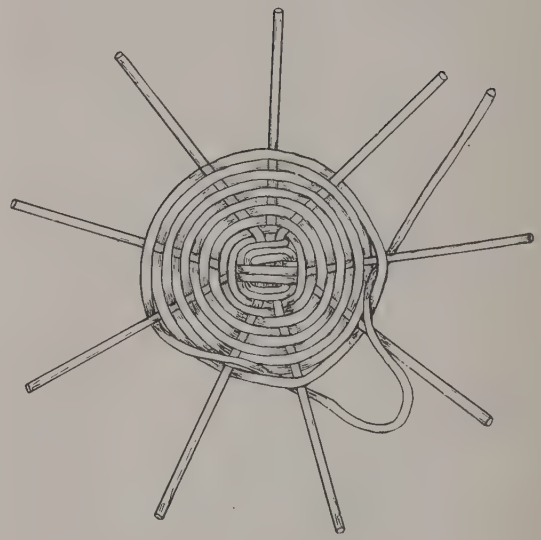


Fig. 224

All spokes must be cut the same length before beginning the border. The loops must be adjusted after the ends are cared for. The length of the spokes required after overcasting may be found by trial.

Pairing Weave

Fig. 226 shows the method of starting a mat using the pairing weave. In this exercise there are eight pieces of No. 4 reed, each 14 in. long. Four pieces

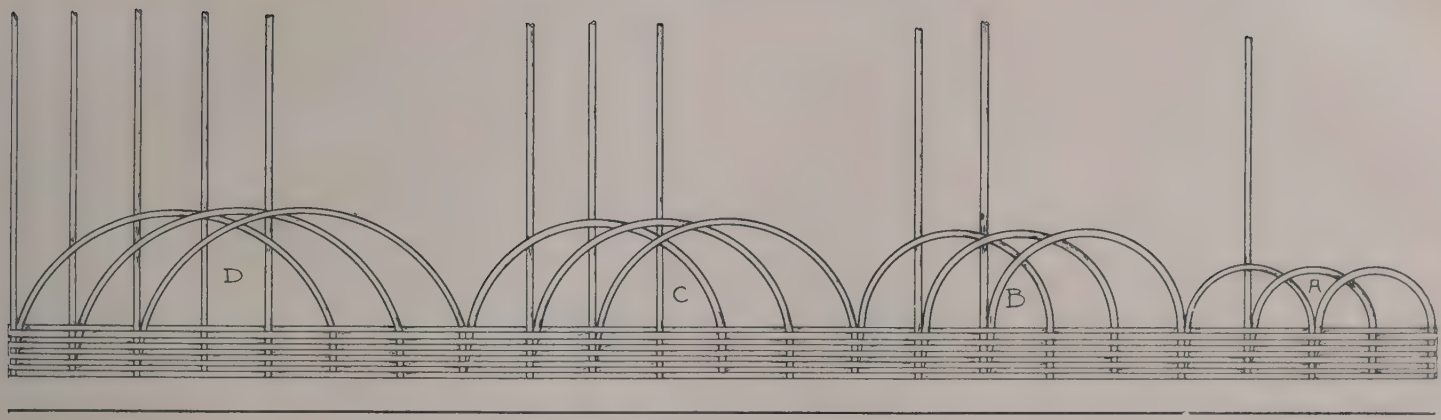


Fig. 225—Method of Weaving Borders

pass through four pieces, giving 16 spokes. The split pieces are held horizontally. The weaver is doubled in the middle, and is started around the vertical group just above the horizontal ones, one end being in front of and the other behind the vertical group, thus forming two weavers, A, Fig. 226. The front weaver passes in front of the vertical group and back of the horizontal group. The rear one goes to the right across the back of the vertical group and down in front of the horizontal group, B, Fig. 226. In this way the two weavers continue around the groups of fours several times, C, Fig. 226.

At A, Fig. 227, is shown the separation of the groups into pairs, while at B, Fig. 227, is shown the separation of pairs into singles. Just as soon as the spokes are the same distance apart single weaving may begin by taking the rear weaver and bringing it over one spoke and under the next. Continue in this way until around. The weaver now comes outside of the other weaver and stops. The inside weaver now weaves around until it comes to the same position with reference to the first one. Continue to weave with first one and then the other, each as a single weaver, until the desired diameter is reached.

To Overcast

The weavers are stopped on opposite sides of the weaving. One weaver is used in overcasting until it reaches the other weaver. The other weaver

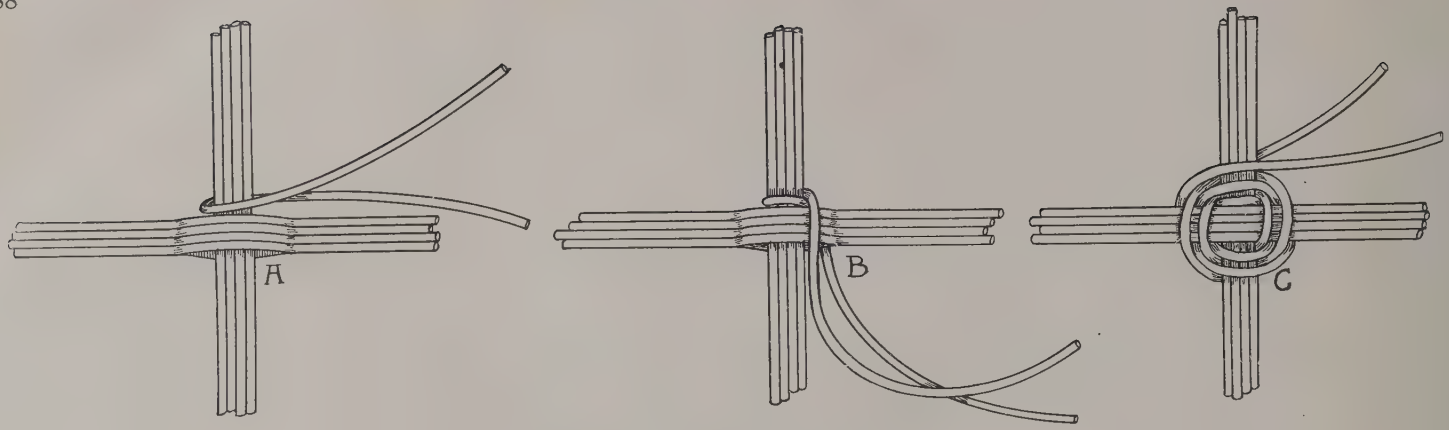


Fig. 226—Starting Pairing Weave

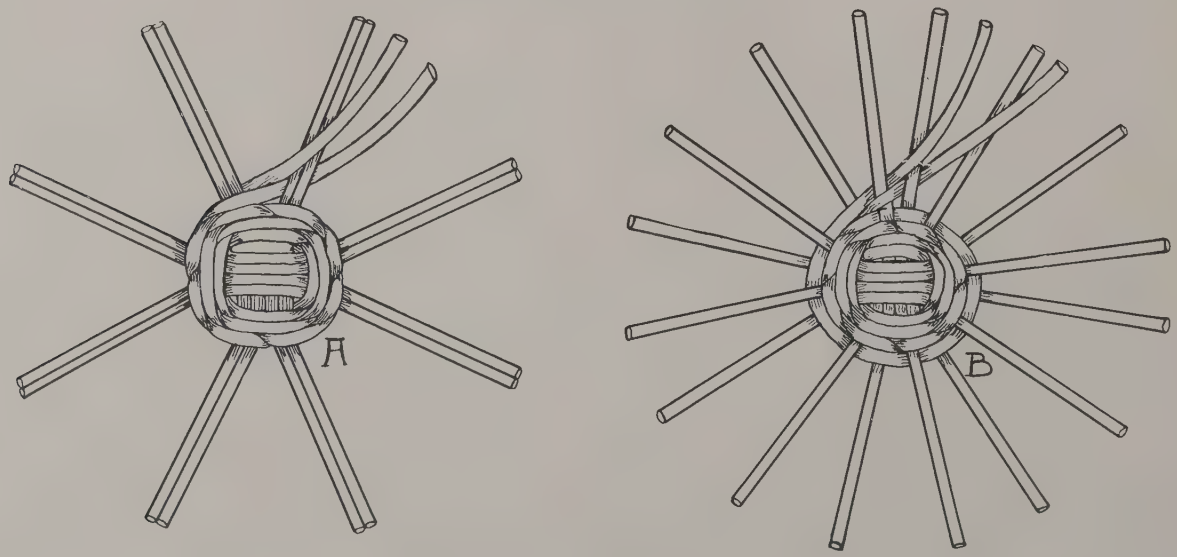


Fig. 227—Separating the Groups

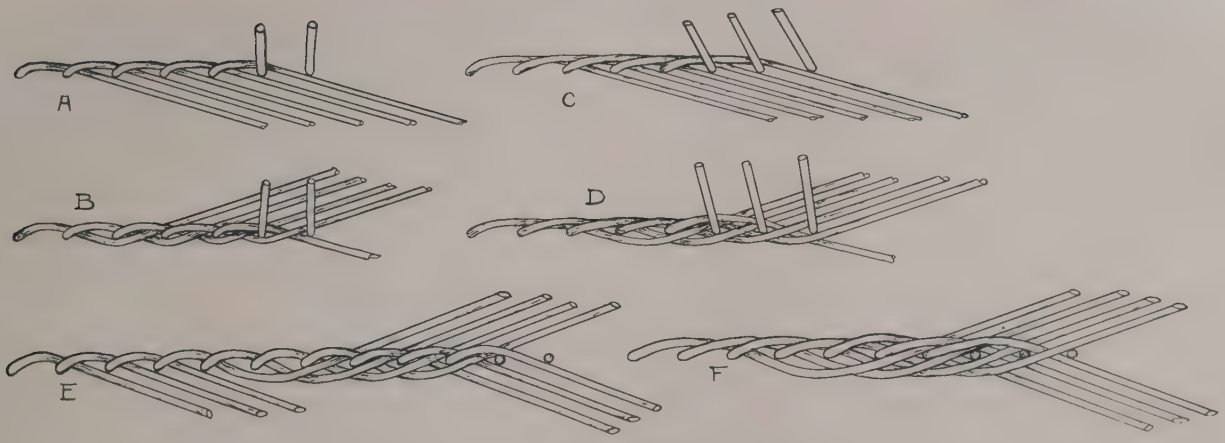


Fig. 228—Method of Weaving Closed Borders

is then used in the overcasting until it comes opposite the place where the first stopped. If a looped border is desired, follow the directions given in making the first mat.

Closed Borders

Fig. 228—A, B, C, D, E, and F—shows the various steps in making a closed border.

A, Fig. 228, shows the starting of the first row of the weaving of a closed border, and B shows the finished border. The starting spoke is No. 1. No. 1 goes behind No. 2 and out; No. 2 behind No. 3 and out, and so on around, the last spoke going behind No. 1 and out.

Pull all ends tightly.

The ends are now on the outside of the basket and must be pushed back to the inside. B, Fig. 228, shows the ends drawn to the inside. To do this, start with any spoke, put it in front of the next to the right, through the loop into the inside of the basket just before getting to the next spoke. When all the ends have been drawn to the inside, they are cut off close to the border.

In C, Fig. 228, the first spoke goes to the right behind two and out.

In D, Fig. 228, is shown the finish of C. Each spoke goes in front of two and through to the inside just before getting to the next.

In the first half of E, Fig. 228, each spoke goes behind one and out, the spokes all being on the outside.

The second half of E shows the spokes passing in front of two, through the loop to the inside.

In F, Fig. 228, each spoke goes behind two and out and in front of three to the inside.

Other Mats

B, Fig. 214, shows a mat with an uneven number of spokes and a single weaver. It will be observed that the beginning weaving of this mat is of raffia. Raffia is somewhat easier to weave in and out than the reed. Reed, however, is desirable in beginning the weaving.

C, Fig. 214, shows a mat, the spokes of which are round and the weaver of split reed or reed windings.

D, Fig. 214, shows a mat having an uneven number of spokes and two weavers which pursue the same course as a single weaver would. When this is done it is advisable to select weavers of different lengths in order that only one will run out at a time, thus making it easy to add new weavers.

This kind of weaving is not called double weaving.

E, Fig. 214, shows a mat having an even number of spokes and two weavers, one natural and the other colored. This is called the pairing or double weave.

F, Fig. 214, shows a mat with an uneven number of spokes.

G, Fig. 214, shows a triple woven mat in which the number of spokes is divisible by the number of weavers. Three weavers used.

H, Fig. 214, shows a triple woven mat in which the number of spokes when divided by the number of weavers leaves a remainder of one. Three weavers are used, two colored and one natural.

I, Fig. 214, shows a triple woven mat in which the number of spokes divided by the number of weavers leaves a remainder of two.

Three weavers are used, two colored and one natural.

In making mats and baskets it is most interesting to experiment, using different numbers of spokes and various combinations of weavers.

This work offers splendid opportunity for originality.

Baskets

Fig. 231 shows a number of interesting baskets, some of which will be described later. In the beginning of basket-making care should be taken not to allow the pupils to undertake baskets too large.

This is one reason why so many poorly made baskets are turned out by inexperienced workers.

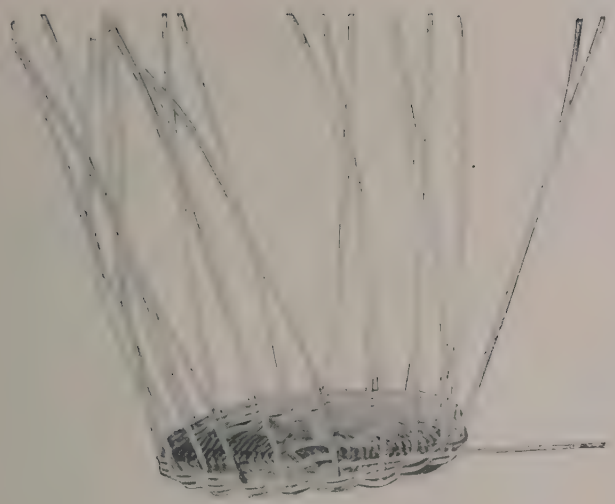


Fig. 229—Spokes Turned Up

The first basket is little more than a mat. The spokes are cut a little longer to allow for turning up.

The First Basket

Soak the No. 2 reed for about ten minutes if the water is warm and twenty minutes if it is cold. Cut four spokes 12 in. long and one spoke 7 in. long. Proceed as when making a mat. After weaving a diameter of about 2 in. with a No. 1 reed, the spokes, which are still moist, are bent upward. Sometimes when this is done the spokes slightly break. There is no particular harm in this.

In weaving the first time around after turning up the spokes the weaver does not keep them in an upright position. After going around several times they are in the position as shown in Fig. 229.

The face of the weaving which was next to the body of the worker becomes the outside of the bottom. When the spokes are bent they are turned away from the body in order that the weaving may proceed from left to right without the interference of the stakes as shown in Fig. 230.

Shaping the Basket

The shape of the basket is determined at this point in the weaving. If a straight, perpendicular sided basket is wanted pull the weaver, or in other words give the weaver tension enough to hold the stakes upright. If a straight flaring sided basket is desired do not give the weaver so much tension, thereby allowing the stakes to flare. In weaving all straight sided baskets, after the stakes stand at a satisfactory angle, be careful to see that the weaver has no tension whatever.

In the beginning of basket making the person weaving seemingly has no control of the material and the shaping of the basket. With a little experience this difficulty disappears and the worker gains control of both the material and the shaping of baskets.

If a curved-sided basket, similar to A and B, Fig. 231, is wanted, start with the stakes quite flaring, and keep an even tension on the weaver as the weaving progresses and until the desired curve is woven in.

Always remember that tension on the weaver will bring the stakes together. When the basket is woven to the desired height, the top is overcast around the stakes just as it was done around the spokes of the mat.

When this is done the basket may be finished satisfactorily by using the border, A or B, Fig. 225. The stakes should be cut long enough to push through the weaving until they come out at the bottom of the basket. This will stiffen the sides and give it a more finished appearance.

After all the stakes are pushed through, all the curves and loops of the border are made regular in height and outline. This is done either by measurement or by turning the basket bottom side up on a flat surface, making all the loops touch this surface.

Other Baskets

The basket on which P, Fig. 231, stands is an interesting one. The spokes, 12 in number, are cut 30 in. long of No. 3 reed. Six of the spokes are split and the other six are passed through the split ones as described in the making of mats.

Fig. 230—Holding Work While Weaving

To secure an odd number of spokes one of the now 24 spokes is cut away and the work proceeds as when making a mat. Weave with a No. 2 reed until a diameter of 6 in. is reached. Instead of breaking the spokes to turn them upward allow the weaver to do it by pulling or giving it considerable tension. By so doing a very interesting curve is secured at the turning point instead of an abrupt turn.

In the weaving allow the stakes to flare while weaving about 2 in. of the upright part of the basket. At this point begin to give the weaver considerable tension, thus drawing the stakes closer together. Continue to weave for about 2½ in. more. The diameter of the opening at the top is little more than the diameter of the bottom.

Finishing the Top

To finish the top proceed as shown at A, Fig. 228. Each spoke passes back of the one at the right and out. Continue until all the spokes extend outward. The spokes now all extend outward as shown at A, Fig. 228. They are next, each in its regular order, passed to the inside as shown at B, Fig. 228. Cut away the ends on the inside.

M, Fig. 231, shows another basket constructed very much the same as the one just described, the shape being somewhat modified.

C, D, and E, Fig. 231, are forms used for hanging baskets. D was made to hold an olive bottle and may be used for cut flowers.

J, Fig. 231, is an interesting little work basket. Around the top a wooden kindergarten bead is placed on each stake. The weaving then continues several times more around and is finished as suggested in any of the different ways as shown in Fig. 228.

Another Way to Begin Baskets

Fig. 232 shows a simple and effective way for beginning a basket. Cut sixteen pieces of No. 3 reed and arrange in groups as shown in Fig. 232. First a perpendicular cross is formed with two of the groups. The other two groups are placed between the parts of the perpendicular cross as shown in Fig. 232. Begin to weave by placing the end of the weaver under one of the groups forming the perpendicular cross. Continue to weave over and under until once around. This weaving may continue three times around, the weaver passing over and under the same groups each time around, or the course of the weaver may be changed each time around. The course of the weaver is changed by allowing it to pass under or over two groups. This changing is clearly seen in Fig. 232.

Fig. 231—Reed Woven Baskets

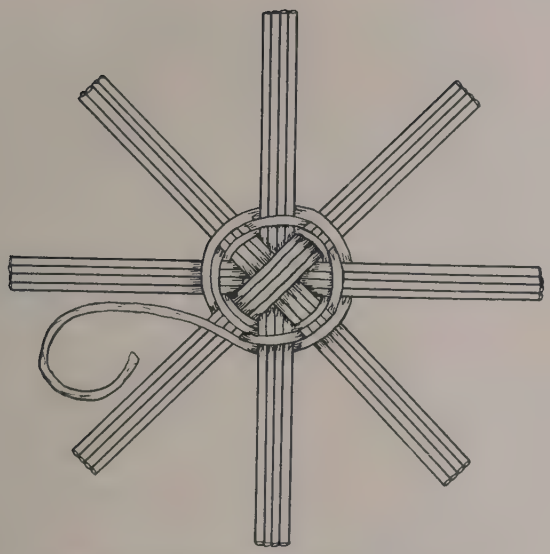


Fig. 232—Starting with Sixteen Strands

After weaving over and under the groups of four each group is divided, and the weaver passes under and over two at a time as shown in Fig. 233. If so desired each group of two may be divided into singles and the weaving continued.

Large Baskets

H, B, and N, Fig. 231, show baskets somewhat larger than the others shown in Fig. 231.

In all the preceding baskets the spokes were cut long enough to complete the basket.

In A, B, and N, the spokes are cut long enough to make the bottom only, as shown in Fig. 234. When the bottom is completed two spokes are inserted, one at each side of each single spoke as shown in Fig. 235. This doubles the number of spokes used in making the bottom, thus giving added strength to the completed basket.

After the new spokes have been inserted, the weaving continues a couple of times around before

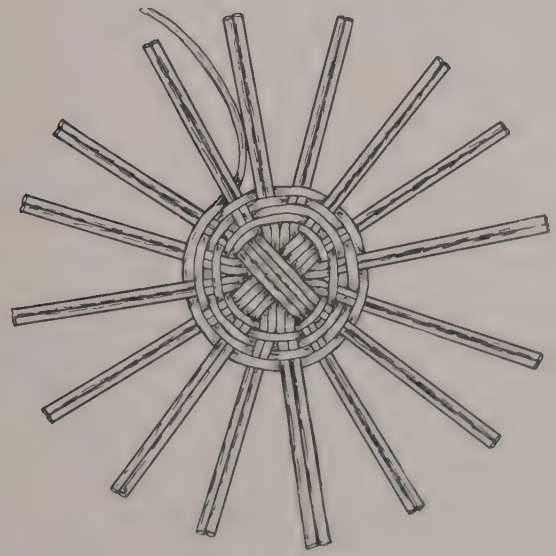


Fig. 233—Dividing Groups Into Pairs

turning upward. The spokes now become stakes. Baskets A and B have curved sides. This is accomplished by allowing the stakes to flare while weaving and keeping an even tension on the weaver as the weaving progresses until the desired curve is woven in. After reaching the top of the basket other pieces of reed are inserted by the sides of the stakes.

There are now two reeds in each place instead of one.

To finish the top allow one pair to pass behind the one next to it and then to the outside of the basket as shown in Fig. 236. These ends are long enough

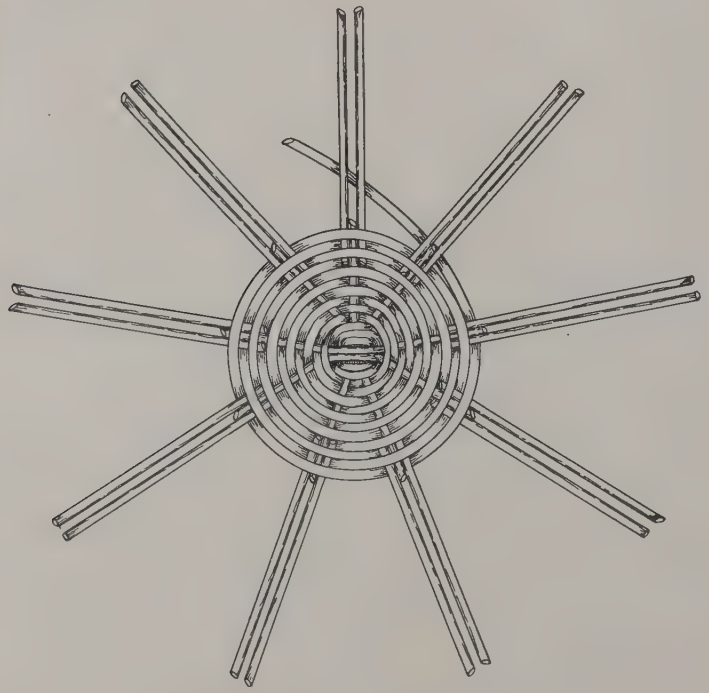


Fig. 234—Inserting New Spokes.

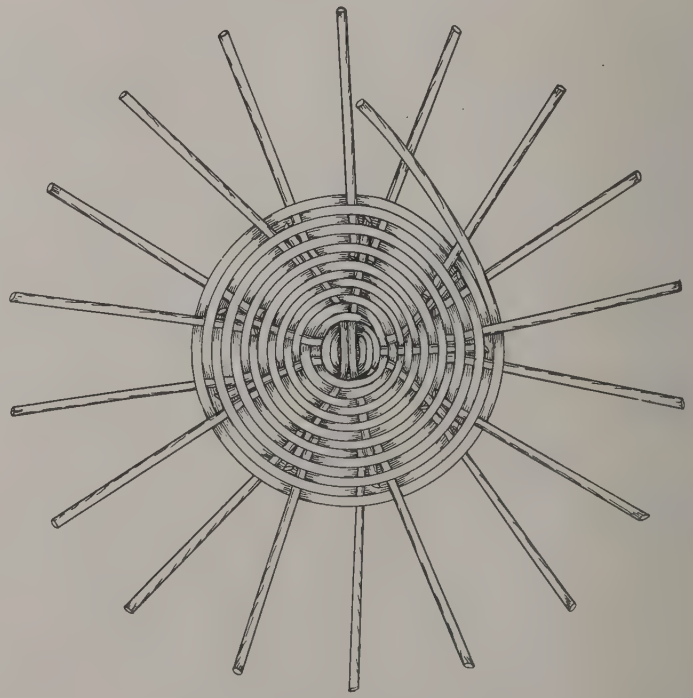


Fig. 235—Dividing New Spokes

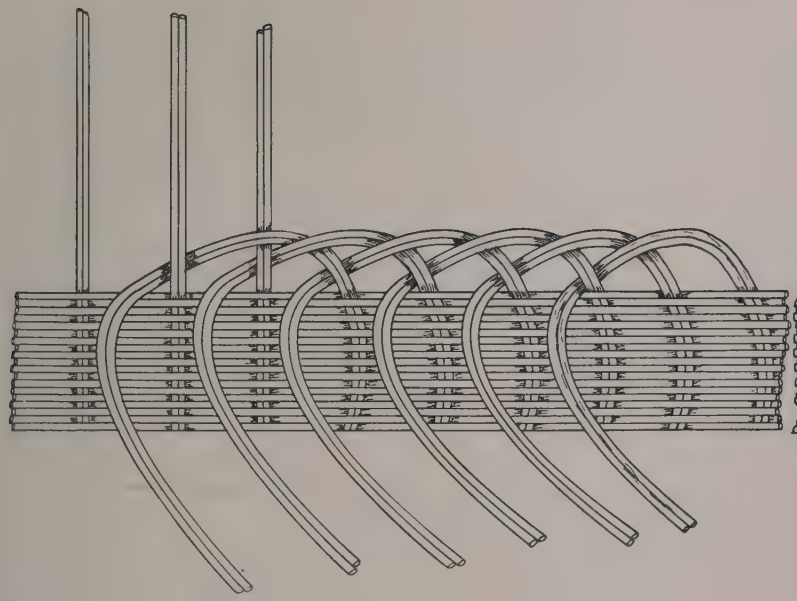


Fig. 236—Finishing Top of Basket

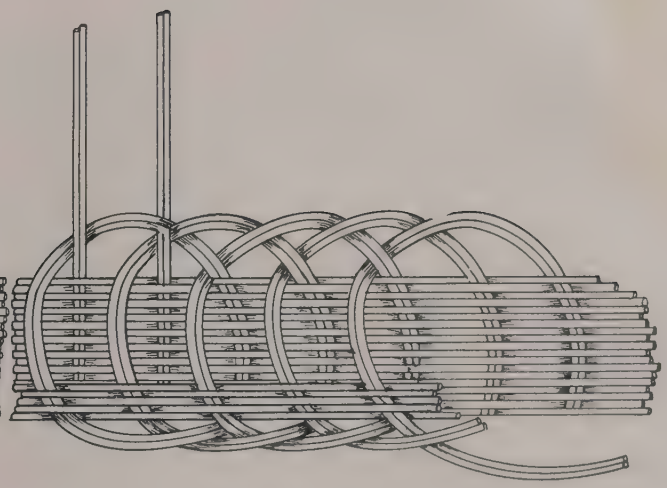


Fig. 237—Finishing Bottom of Basket

so that each is tied to the bottom of the basket. This is best accomplished by using a darning needle threaded with a piece of string. Begin to sew the ends down by allowing the needle to come from the inside of the basket next to a stake, over the pair turned downward, pulling it close to the stake. The needle now comes out next to the following stake, over and then in. This is continued until all the pairs have been sewed down. Fig. 236. With the pair in the position as shown in Fig. 236 one end of a new weaver is inserted and the weaving is continued around the pairs as shown in Fig. 237. The bottom of the basket is finished the same as the top is usually finished. Fig. 237.

F and G, Fig. 231, are two fruit trays started in the way just described. The weaver passes under and over two stakes each time instead of one. To finish the top follow the plan as shown in Fig. 236.

Two stakes pass behind two and then out and down, the spokes being cut long enough to do this. Each pair of stakes making the border is tied at the bottom to keep it in place. These ends at the bottom are treated as the spokes of a basket. With a new weaver weave around the bottom several times. This weaving and the finish make a standard on which the tray stands. Finish the bottom as shown in Fig. 237. When all is finished the string used in tying is cut away.

Handles

The handle forms a very important part of the basket upon which it is built. It must be constructed correctly, in order that it may add beauty and utility to the basket, and possess strength itself. We have tried to show in Fig. 238, as clearly as possible, the successive steps in the making of a twisted handle. In explanation, let us add, that only that part of the basket which influences the making of the handle is shown in the illustrative steps in Fig. 238.

It must be kept in mind, that the number of times the weaver twists around the foundation reed, depends entirely upon the diameter of the semi-circle and the size of the weaver. After a little experience in the weaving of handles, one will be able to judge accurately the ratio of the number of twists to the diameter of the semi-circle and the size of the weaver of different size handles.

For example, take one end of a piece of No. 4 reed and insert it between two spokes of a basket as shown at 1-A, Fig. 238. The other end of the reed is then curved over and inserted between two other spokes about three or four spokes away from the two spokes first mentioned, as shown at 2-A, Fig. 238. This semi-circle forms the foundation upon which the twisting is done.

A piece of No. 2 reed soaked in water until very pliable is now inserted to the left and alongside of the right hand side of the foundation reed as shown at A, Fig. 238. This reed is now twisted around the foundation reed three times, coming to the outside of the basket as shown at B, Fig. 238.

It is now put through to the inside of the basket, outside of the left-hand side of the foundation reed, and about three, four or five strands below the border, or just below the border, and then brought up and to the outside just below the first twisting. From here it follows the first twisting back to the starting point. Be sure to keep the weaver beside the first twist. Do not let it cross the first one, but keep it beside the first at all times. It now goes to the inside of the basket and is put through to the outside, to the right of the right hand side of the foundation reed and is brought up. This course can be easily followed in C, Fig. 238.

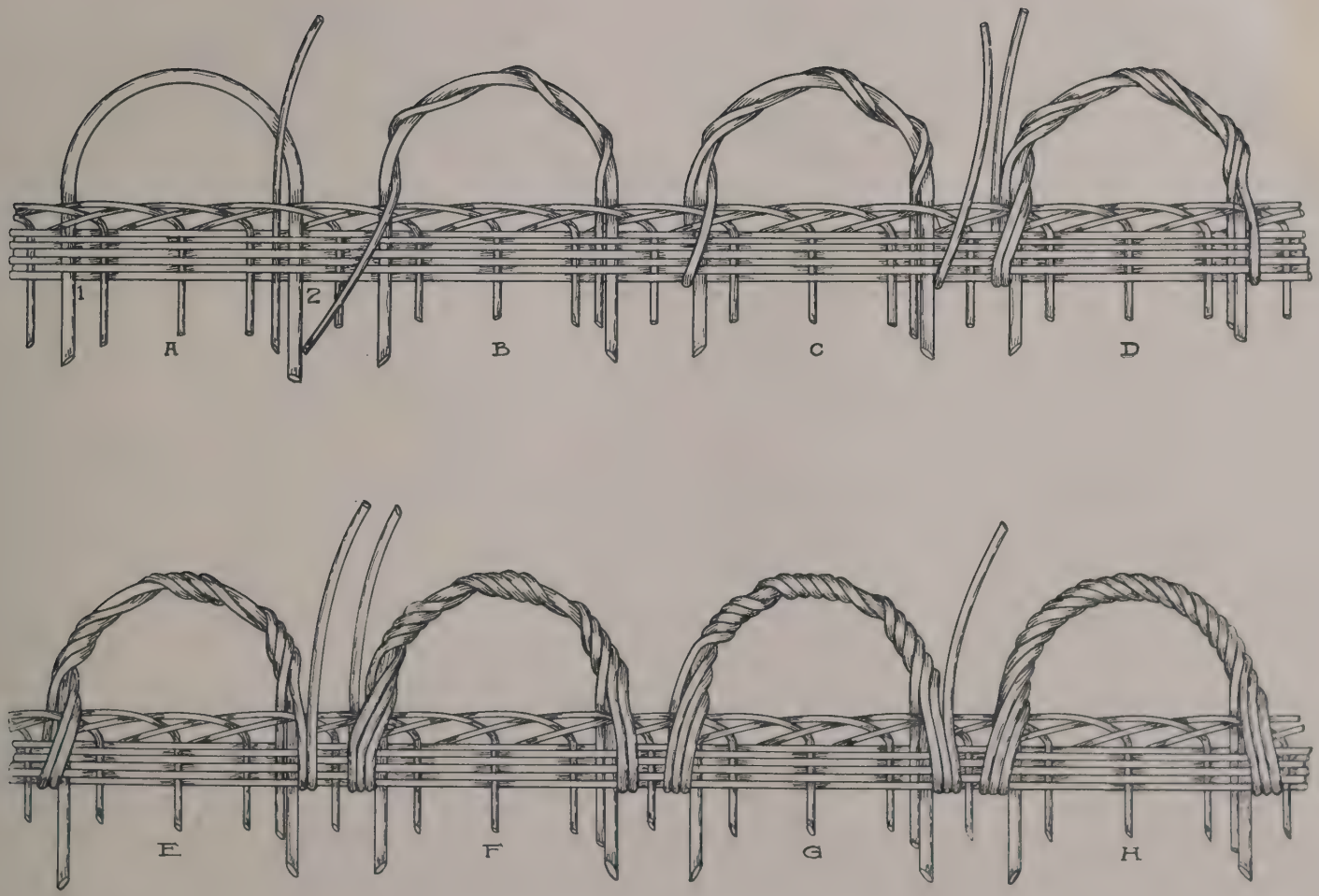


Fig. 238—Steps in the Wrapping of a Handle

From here the weaver is twisted to the left, beside the first two twistings, until it again reaches the left hand side of the handle. It is then placed through to the inside of the basket to the left and alongside of the weaver already there, instead of to the right of the weaver already there, as one is apt to do when learning. At D, Fig. 238, this step is shown very clearly.

The weaver is then twisted back beside the others to the right hand side of the handle to the inside of the basket, and then to the outside to the right and alongside of the weaver already there as shown at E, Fig. 238, remembering that it goes to the right, not to the left, of the weaver already there.

It is now twisted back beside the others, until it reached the left hand side of the handle to the outside of the basket and then it is placed through to the inside to the left of the other two as shown in F, Fig. 238.

From here it is twisted back to the right hand side of the handle to the inside of the basket and put through to the outside to the right of the other two as shown in G, Fig. 238.

It is now twisted back for the last time to the left hand side of the handle; the end is pushed in between the front and back weavers, and is cut off. The handle is then complete as shown at H, Fig. 238. It now has the appearance of a tightly twisted piece of rope.

Covered Forms

Very often good pottery forms may be secured at an unusually low price. The decoration, however, is so atrocious that one hesitates to make a purchase even at the lowest price.

By using reed, good forms may be covered, thus eliminating the unattractive features.

In Fig. 242 are shown several pieces covered as above mentioned. The sandwich plate is not included in what might be called poor art.

To Cover a Sandwich Plate

At any department store may be found plates of good English prints. Among the most common are the Indian Tree and Parrot plates. These when covered, as shown in Fig. 242, make most attractive sandwich plates.

To cover the plate proceed in the following way: On a piece of pine board draw a circle having a diameter equal to the diameter of the bottom ring of the plate.

The plate itself may be placed on the board and drawn around, thus securing the circle required.

Cut 12 pieces of No. 2 reed, each 16 in. long. Soak in warm water. When sufficiently pliable, bend each

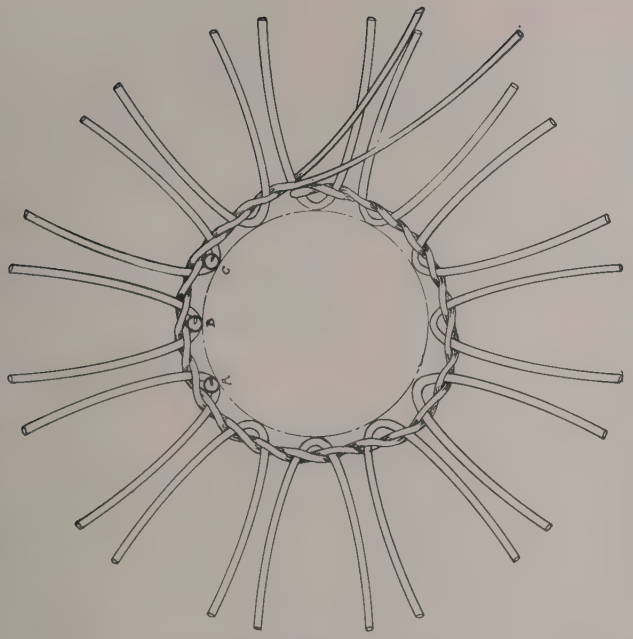


Fig. 239—Starting the Weave

piece of reed at the center, and thumb tack each to the board on the circumference of the circle just drawn. See A, B, and C, Fig. 239. When all are tacked, with a No. 1 reed weave around the entire circle, using the pairing weave.

Weave several more times around as shown in Fig. 240. The spokes are now crossed as shown in Fig. 240. A space is left and the pairing weave again is used once around. The weaving is done as the spokes are crossed. From this point the single weave may be used but not until Fig. 240 is removed from the board and tied to the plate. The remainder of the weaving is done over the plate.

Fig. 241 shows the underside of the finished plate.

In Fig. 242 may be seen the upper side of the finished plate.

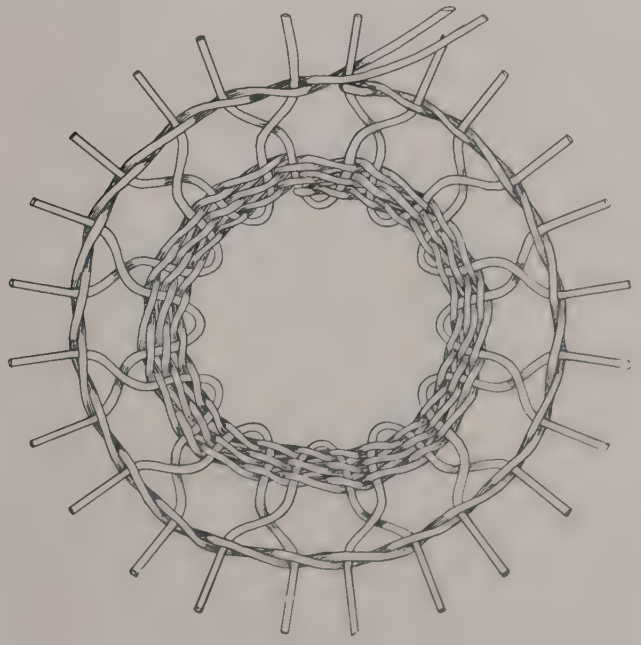


Fig. 240

The top is finished by using any one of the closed borders shown in Fig. 238. The handle is simply a four strand braid, using eight strands of reed but using them in pairs. The looped ends seen in Fig. 241 show the way the handle is fastened to the under part of the plate.

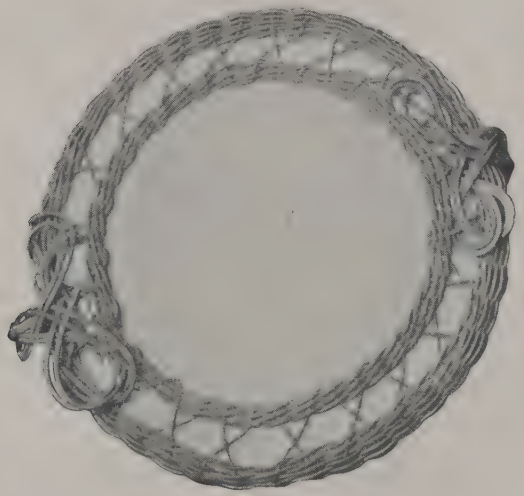


Fig. 241—Outside of Plate

Vase Form in Fig. 242

The tall vase form shown in Fig. 242 may be covered, or the beginning may be the same as when starting a basket. When a diameter is woven equal to the diameter of the bottom of the vase it is tied to the vase and the weaving is done around the form.

The Bowl in Fig. 242

To cover a bowl proceed as when covering the sandwich plate. To finish the top use any closed finish shown in Fig. 238.

The Melon Shaped Basket

The most interesting of all baskets to construct is the melon shaped basket, because of the different

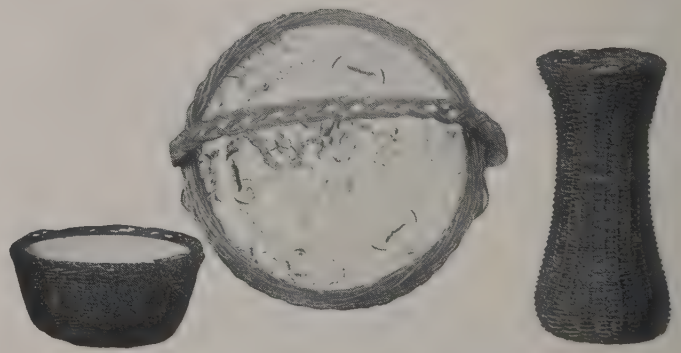


Fig. 242—Finished Covered Forms

steps involved in its method of construction. The foundation upon which this basket is built is two rings. These rings may be either purchased in the form of fancy work hoops, or they may be made of

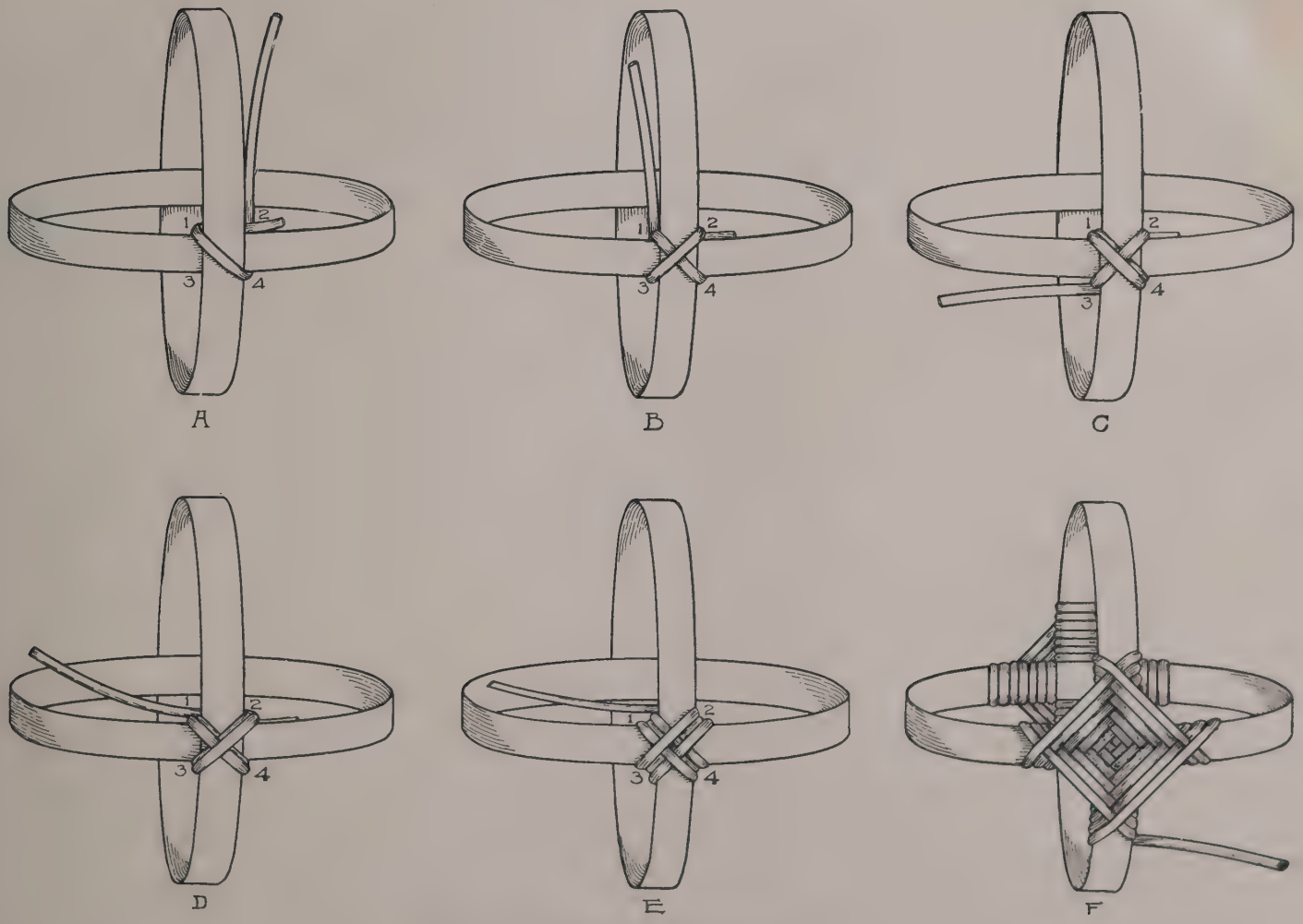


Fig. 243—Foundation of Melon Shaped Basket

heavy ash splints. If they are to be made of the ash splints, take two straight pieces of the ash splints about 3 1-7 times the desired diameter of the basket plus 1 in. for lap, and with fine wire, iron fasteners, or fine string, fasten them together to form the two rings.

At A, Fig. 243, is shown the position in which these two rings are placed so that they are perpendicular to one another. If the half ring that is to form the handle looks shabby it might be improved by wrapping a winder about it.

The weaver is placed behind the vertical ring parallel with the horizontal ring, one end extending beyond the vertical ring about 1 in. as shown at 2-A, Fig. 243. Then bring the other end over and diagonally across the vertical ring from 1 to 4, and then behind and straight across the horizontal ring from 4 to 2 as shown at A, Fig. 243.

Now place the strand over and diagonally across the vertical from 2 to 3 and behind and straight across the horizontal from 3 to 1. This position is shown at B, Fig. 243.

Then take the strand over and diagonally across the vertical from 1 to 4 and bring it behind and straight across the vertical from 4 to 3 as shown at C, Fig. 243.

The strand now travels over and diagonally across the vertical from 3 to 2 and back to its original position at 1 as shown at D, Fig. 243, by passing behind and straight across the vertical from 2 to 1.

The foregoing method of wrapping repeats itself by going over and diagonally across the vertical from 1 to 4, up, behind, and straight across the horizontal from 4 to 2, over and diagonally across the vertical from 2 to 3, behind and straight across the vertical from 3 to 4, up, over and diagonally across the vertical from 4 to 1, down, behind and straight across the horizontal from 1 to 3, up, over and diagonally across from 3 to 2 and then back to its original position at 1 by passing behind and straight across the vertical from 2 to 1. The wrapping should be now as shown in E, Fig. 243.

This method of wrapping should be continued until four pockets are formed, one at each corner, as shown in F, Fig. 243.

The other side of the rings are wrapped in the same manner as shown in F, Fig. 243, and after both are completed the center rib on both sides may be placed into these pockets as shown in Fig. 244-A. An amateur might attempt to place all the ribs in at one time, but this is too difficult to try when learning how to make this basket for the first time.

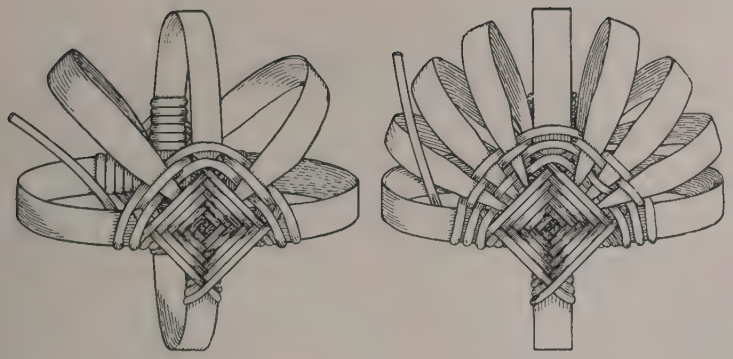


Fig. 244

The ribs may be made of the stout ash splints about 1½ times as long as the diameter of the basket, both ends of the ribs being tapered to a point; or if the ash cannot be had one might use ordinary heavy reed, about a No. 8. If the reed is used a good many more spokes must be had than when using the ash splints. In shaping the ash splints care should be taken that there will be a sufficient space between them when placed in the basket so as not to cramp the weaver. The shape of the basket when finished depends entirely upon the shape of the ribs used, so that it is very important that the ribs be made and placed correctly.

The single weaving is now commenced as shown in A, Fig. 244. After three or four rows are woven at one end, weave three or four rows at the other end, thus fastening the ribs at both ends.

This method of weaving, that is, first at one end and then at the other, must be kept up throughout the entire construction of the basket, finishing the weaving at the center.

Now when the three or four rows are woven at each end we place into the pockets the other four ribs as shown in B, Fig. 244, with the exception that we place the ribs only in the pockets on one side of the basket. This makes it easier to continue the weaving, for while one is weaving at one end the ribs are continually coming out of the other end.

After four or five rows of weaving have been completed at the end into which the ribs were placed, the other ends of the ribs may be placed into the pockets on the other side of the basket, and the weaving done the same as on the first side of the basket. The weaving is then continued first from one side and then from the other. Fig. 245 shows a partially woven basket done in this way. When the center is reached the weaving ends and the basket is complete.

Figs. 246 and 247 show finished melon shaped baskets.

Reed and Wood

We come now to a most interesting and useful combination, that of reed with wood. There is no

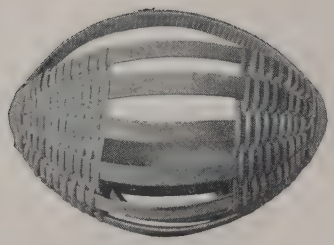


Fig. 245

other combination with wood that gives such a large variety of possibilities as reed.

Serving Tray

The most simple problem in this combination is that of the serving tray, which is nothing more than a slip joint frame, as shown in the working drawing,

Fig. 246

Fig. 247

Finished Melon Shaped Baskets

Fig. 248. Holes the size of the reed to be used, usually a No. 3, are bored 1 in. apart and an extra reed is placed in to give an odd number of stakes. The weaving is done the same as described on the wooden block shown at the beginning of this chapter. It is just the plain weave, using a No. 2 reed until about 1 in. high. Then the weaving stops; the stakes are woven to form any one of the closed borders shown in Fig. 228, having the ends of the stakes come to the outside of the tray. They are then cut off flush with the weaving.

To form the handle bore two holes the size of a No. 10 reed about four stakes apart in place of the holes in the size of a No. 3 reed, as shown in Fig. 248. Then take a piece of No. 10 reed and bend it, placing the two ends into the holes just bored. When weaving, consider the stakes of the handle the same as the rest of the stakes. To finish off the handle wrap it with a reed winding. The handle is wrapped before the weaving is begun.

Strips of $\frac{3}{8}$ in. cove moulding are tacked to the inside of the frame. A glass is then cut to size and fitted in from the bottom. Under this glass may be placed strips of tapestry, splint weaving or water color design as shown in the finished tray, Fig. 249. A heavy piece of cloth board is tacked over the entire bottom of the tray, thus holding the glass in place.

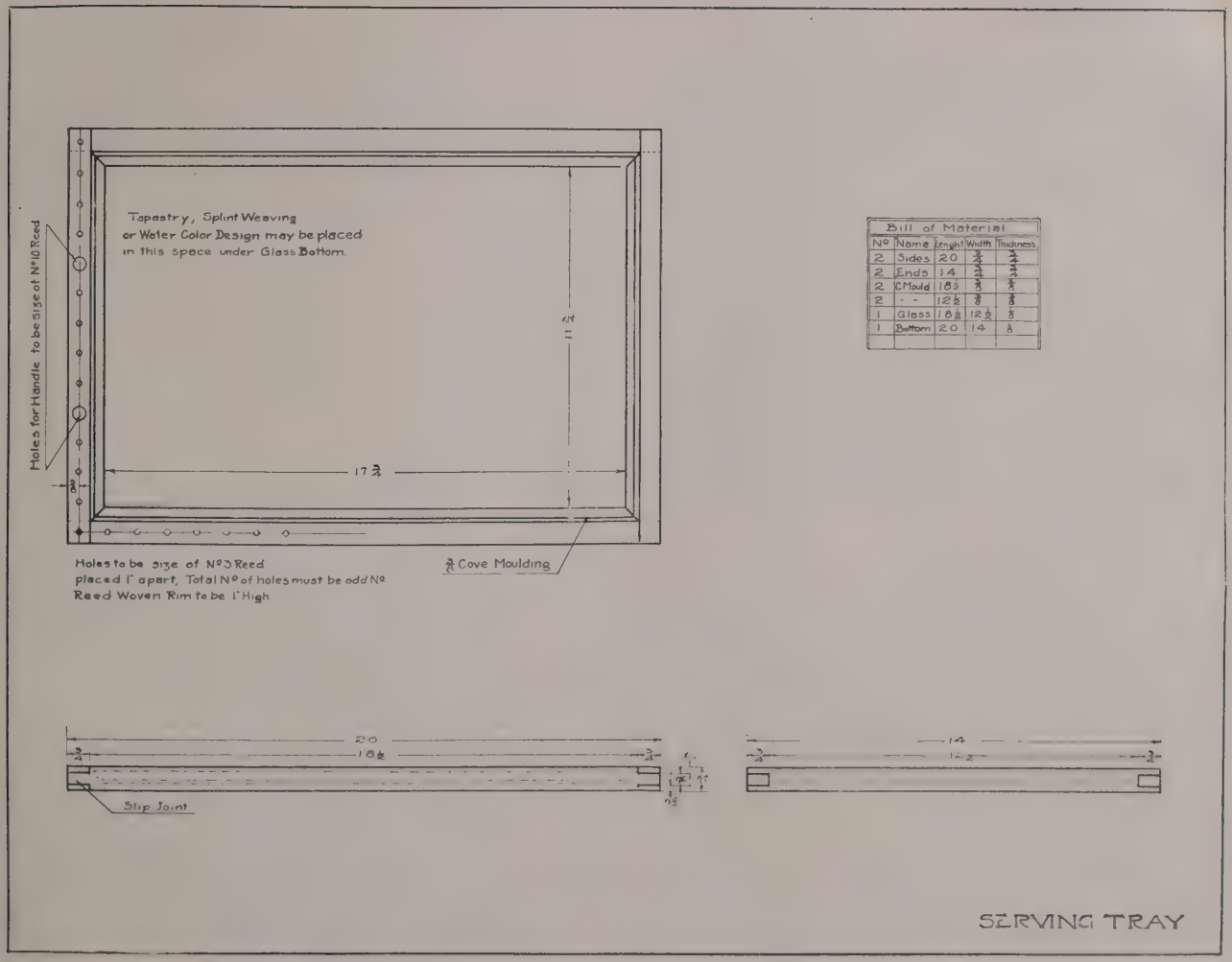


Fig. 248—Working Drawing of Serving Tray (Seventh Grade)

Fig. 249—Finished Tray

Foot Stools

In Fig. 250 is shown the working drawing of a simple reed woven stool. In this stool we use the flat reed, which is similar to the ash and hickory splints used in the preceding chapters. The wrapping is done over the entire upper rails, and both the top and bottom of the seat are woven. This makes a very strong and durable seat. Fig. 251 shows the finished woven top, while Fig. 252 shows the finished stool.

Fig. 253 is the working drawing of another reed woven footstool. In this stool dowel rods are used for the rails, and there is no weaving on the bottom of the seat. Fig. 254 shows the finished stool. The legs may be either turned as shown in Fig. 254, or tapered as shown in Fig. 253.

Fern Stand

The basket shown in Fig. 255 is built on a wooden bottom, $\frac{3}{8}$ in. in thickness.

The upright stakes are of 3/16 in. dowel rods and placed in holes bored on a slant in the upper face of the bottom. These stakes are about fifteen degrees from vertical. The ends of the stakes are dipped in glue before being forced into the holes.

The weavers are of a No. $1\frac{1}{2}$ reed.

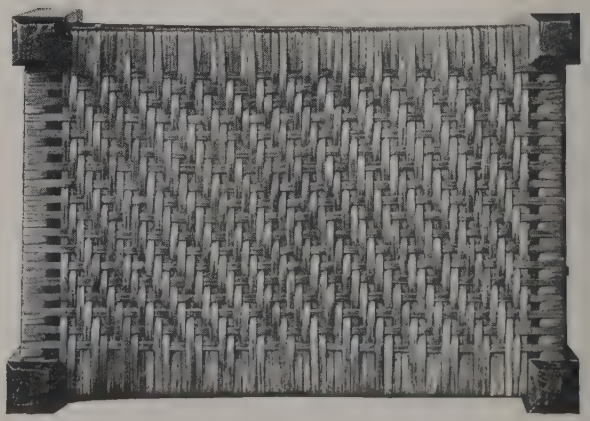


Fig. 251—Woven Seat

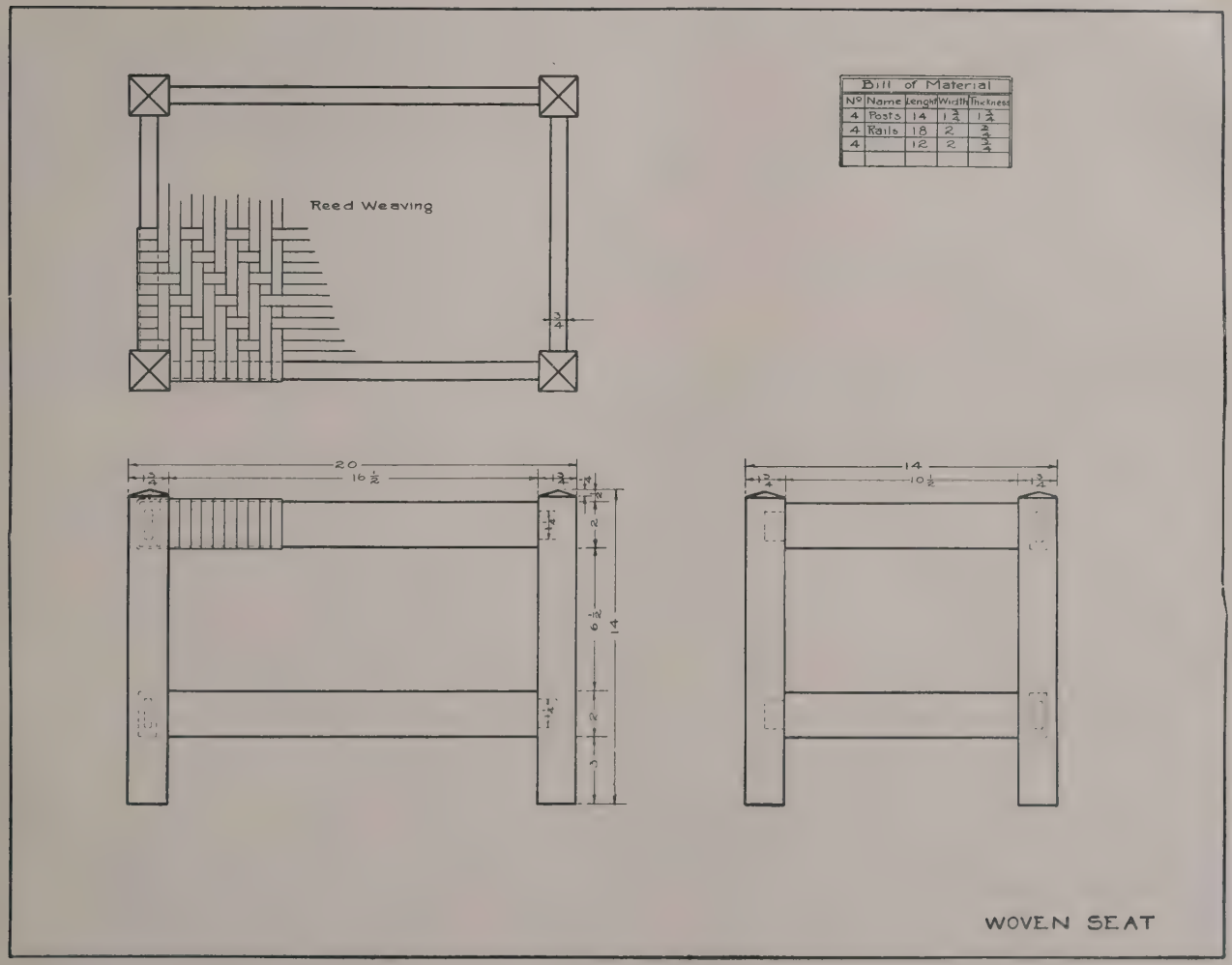


Fig. 250—Working Drawing of Woven Seat (Eighth Grade)

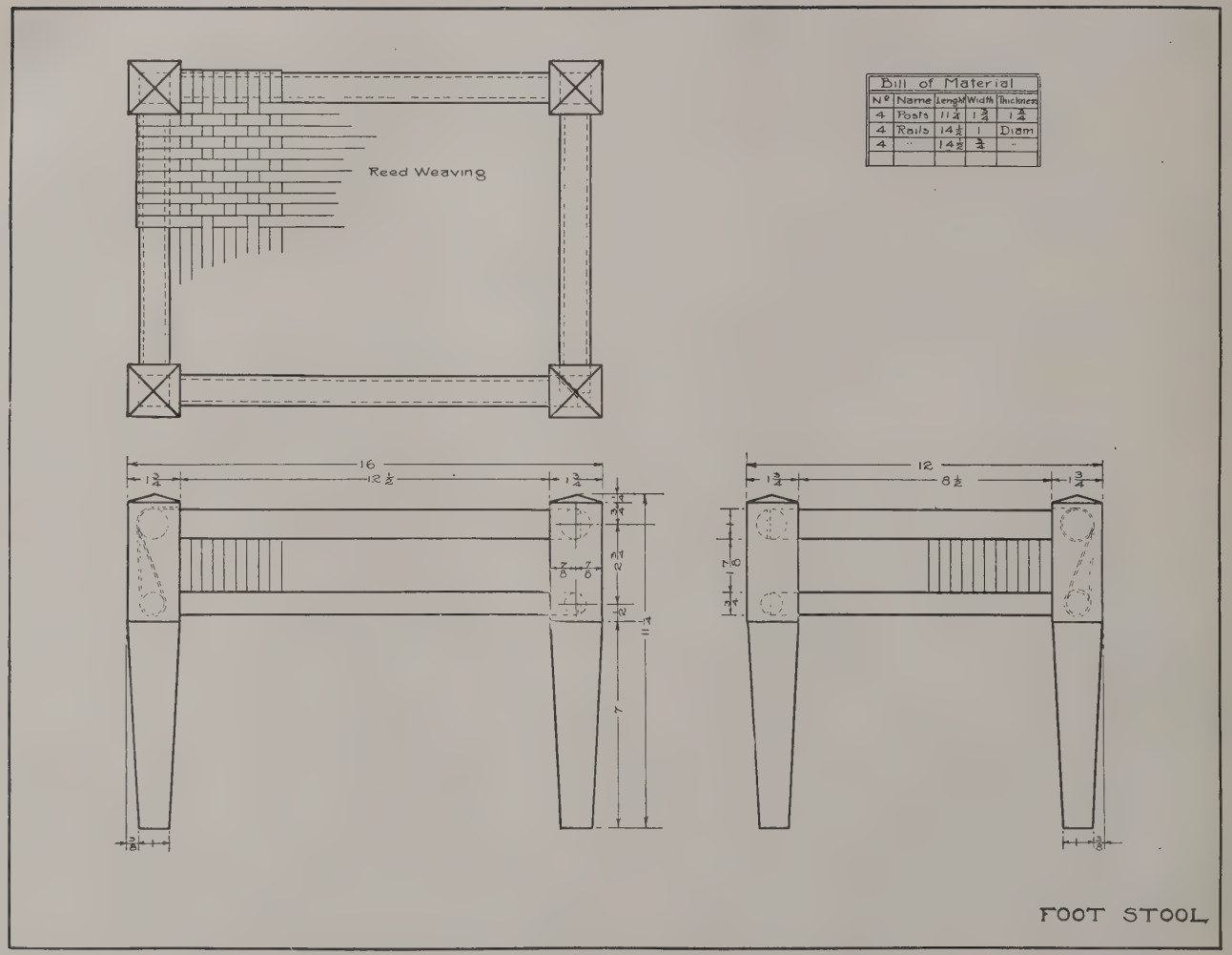


Fig. 253—Working Drawing of Foot Stool (Seventh Grade)

Fig. 252—Finished Stool

Two weavers are carried around at the same time.

The finish at the top is brought about by inserting a piece of the No. 1½ reed at each side of each stake. The length of these pieces is determined by the kind of finish desired.

The circumference of the bottom is finished by tacking a three strand braid of reed around the wooden bottom thus giving it a pleasing finish.

The finish at the top of the basket and the braid around the bottom are stained the same color as the standard, while the body part remains the natural color of the reed.

The basket is more easily kept clean if given a coat of shellac and then a coat of varnish. A galvanized iron pan, about 3 in. in depth, is placed in the basket to keep the water from dripping after the plant has been watered.

Fig. 254—Reed Woven Stool

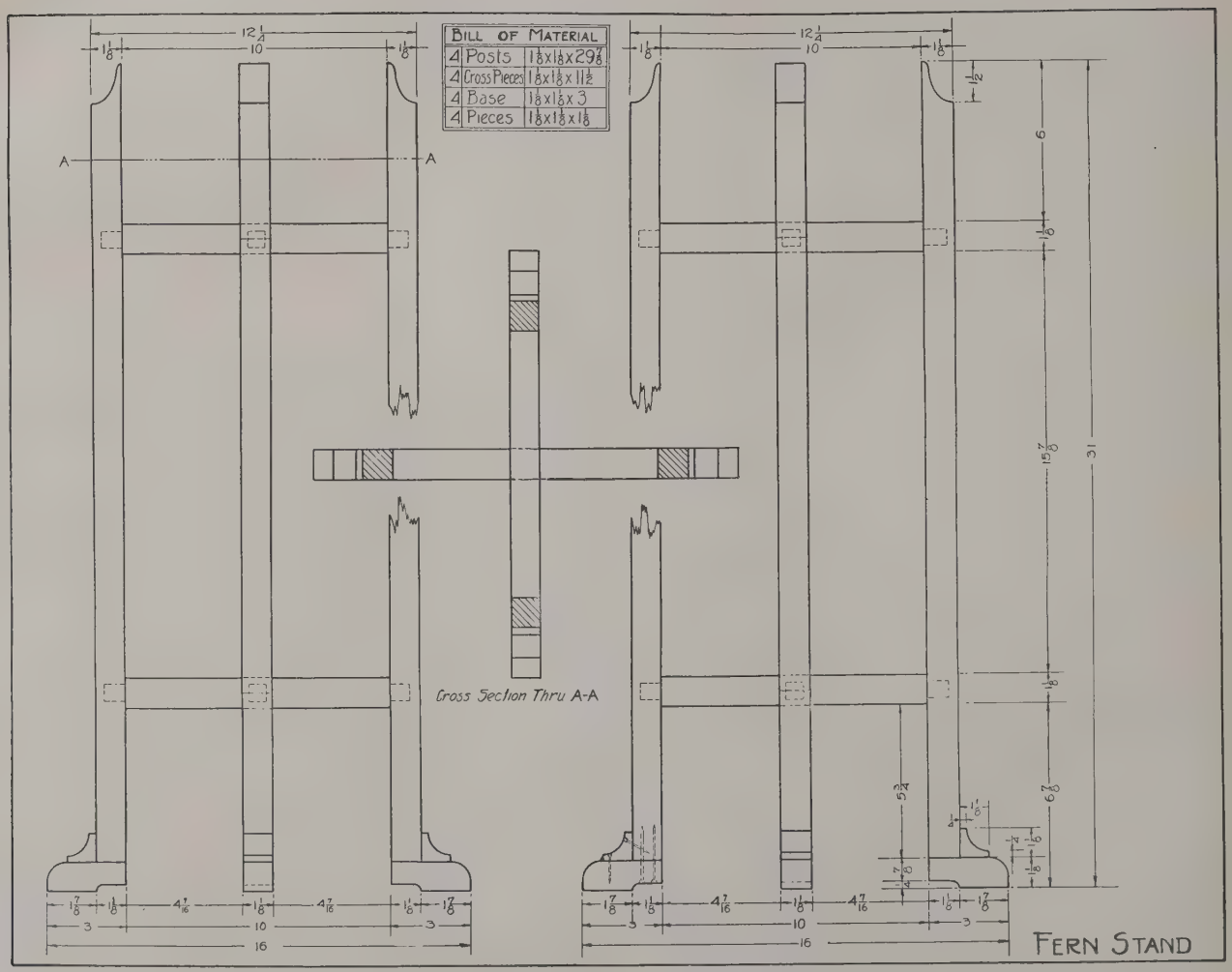


Fig. 256—Working Drawing of Fern Stand. (Sixth Grade.)

Sewing Stands

Unique sewing stands can be made with the combination of reed and wood. Fig. 257 is the working drawing of a sewing stand with a reed woven basket near the top to hold the sewing materials, and a drawer underneath the basket to hold the sewing tools. It is extremely simple in its construction, easy to carry around and a very useful article to have in any home. All details of construction are shown very clearly in the working drawing. The weaving is the same as used in the serving tray, the stakes being glued into the wooden block which forms the shelf. Fig. 258 shows the completed stand.

Fig. 259 is the working drawing of another sewing stand of a little different type. In this the woven basket is a unit in itself, made so it rests upon the bottom shelf, and so that it can be very readily removed from the stand. The box at the top may be used for the sewing tools. The construction of this stand is also very simple, being well within the capabilities of the average seventh-grade boy. It forms a very useful as well as an ornamental piece of furniture. Fig. 260 shows the completed stand.

Fig. 261 is the working drawing of still another sewing stand, by far the most interesting of the three stands shown. The two baskets are integral parts of the stand, having wooden tops and bottoms. This

Fig. 255—Fern Stand

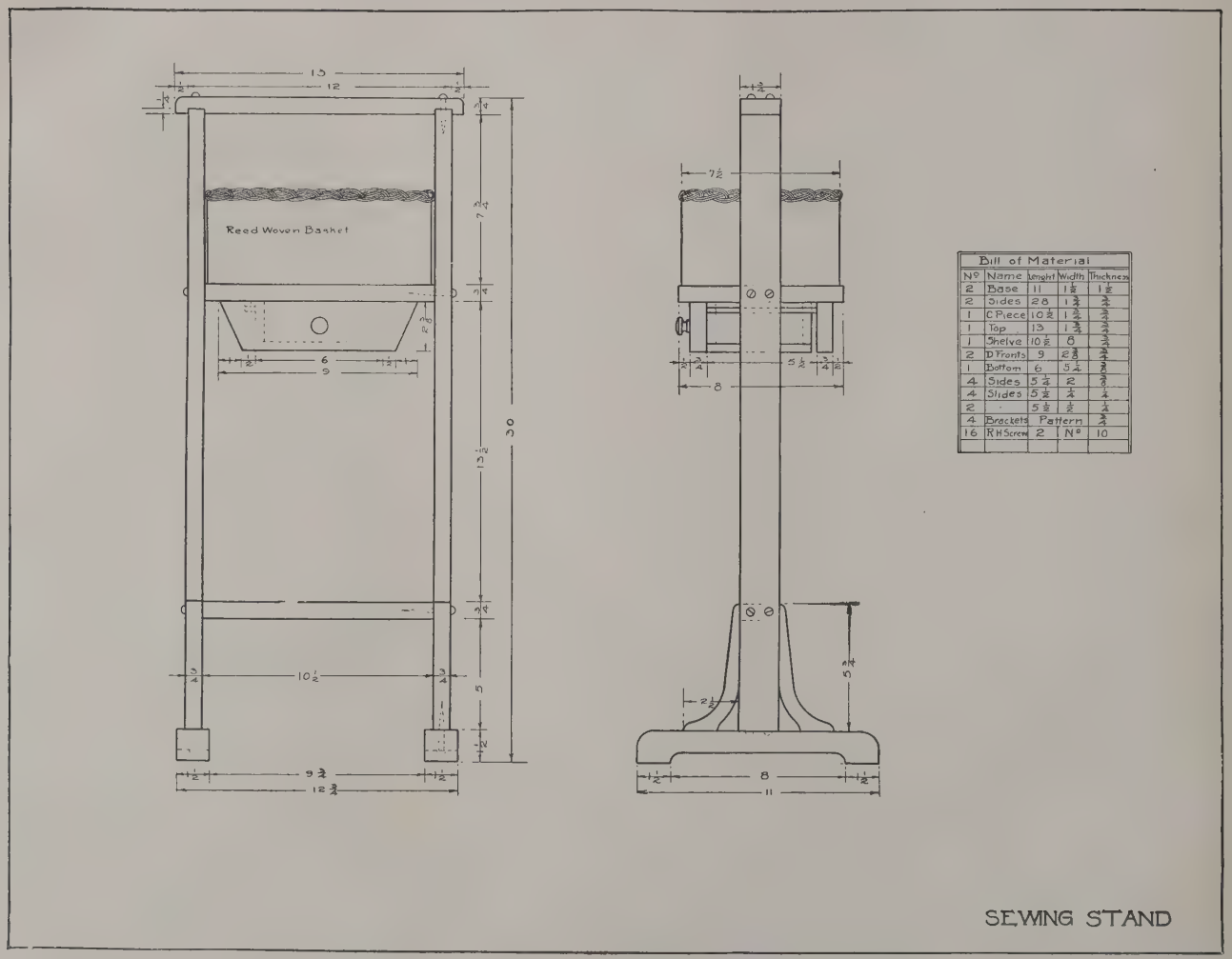
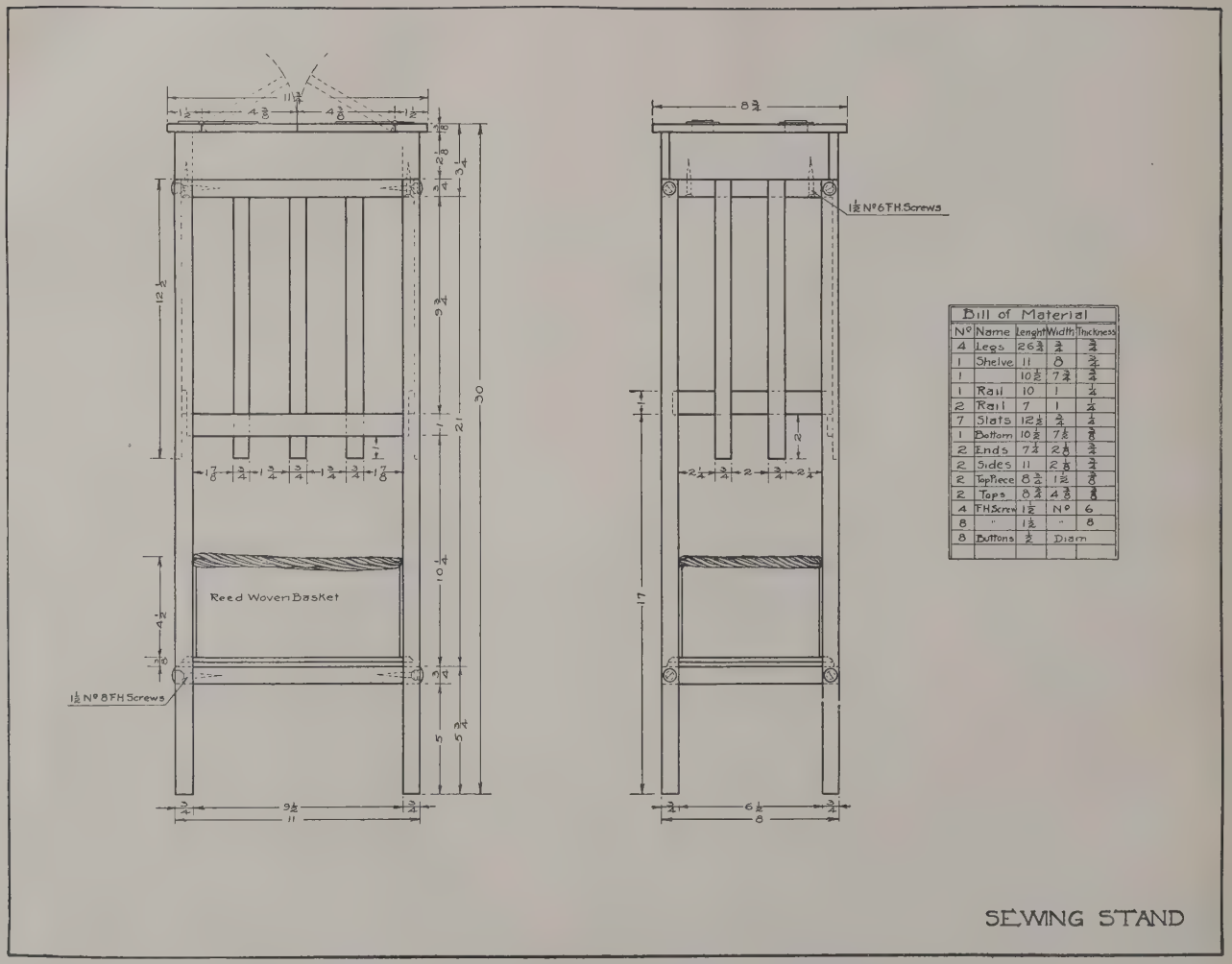


Fig. 257—Working Drawing of Sewing Stand (Seventh Grade)

reinforces the baskets and makes them more firm. The top basket is covered with a hinged lid, while the lower one is left uncovered. Instead of using the reed for the stakes use the $\frac{1}{8}$ in. dowel rods and for the weaver use the reed winding. To prevent the corners from drawing in place two dowel rods at each corner, one behind the other, far enough apart so that the weaver can slip between them. If placed correctly only one dowel rod can be seen at each corner. The weaver never passes to the inside of this extra stake at each corner. The construction of this stand is a little more difficult than the preceding ones and should be confined to the eighth grade only. Fig. 262 shows the completed stand.

Fig. 258—Sewing Stand



Bill of Material				
N°	Name	Lenght	Width	Thickness
4	Legs	26 3/4	2 3/4	3/4
1	Shelve	11	8	3/4
1		10 5/8	7 3/4	3/4
1	Rail	10	1	1/4
2	Rail	7	1	1/4
7	Slats	12 1/8	2/4	1/4
1	Bottom	10 5/8	7 1/8	3/4
2	Ends	7 3/4	2 1/8	3/4
2	Sides	11	2 1/8	3/4
2	Top Piece	8 3/4	1 1/2	3/4
2	Tops	8 3/4	4 3/8	3/4
4	F.H. Screw	1 1/2	N°	6
8	"	1 1/2	"	8
8	Buttons	1/2	Diam	

Fig. 259—Working Drawing of Sewing Stand (Eighth Grade)

Fig. 260—Finished Stand

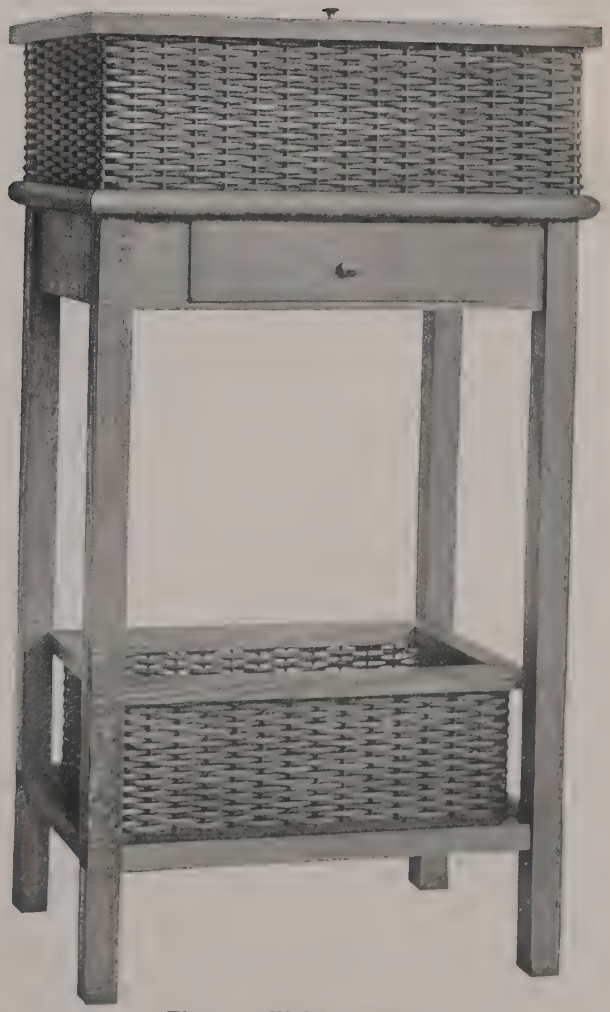


Fig. 262—Finished Stand

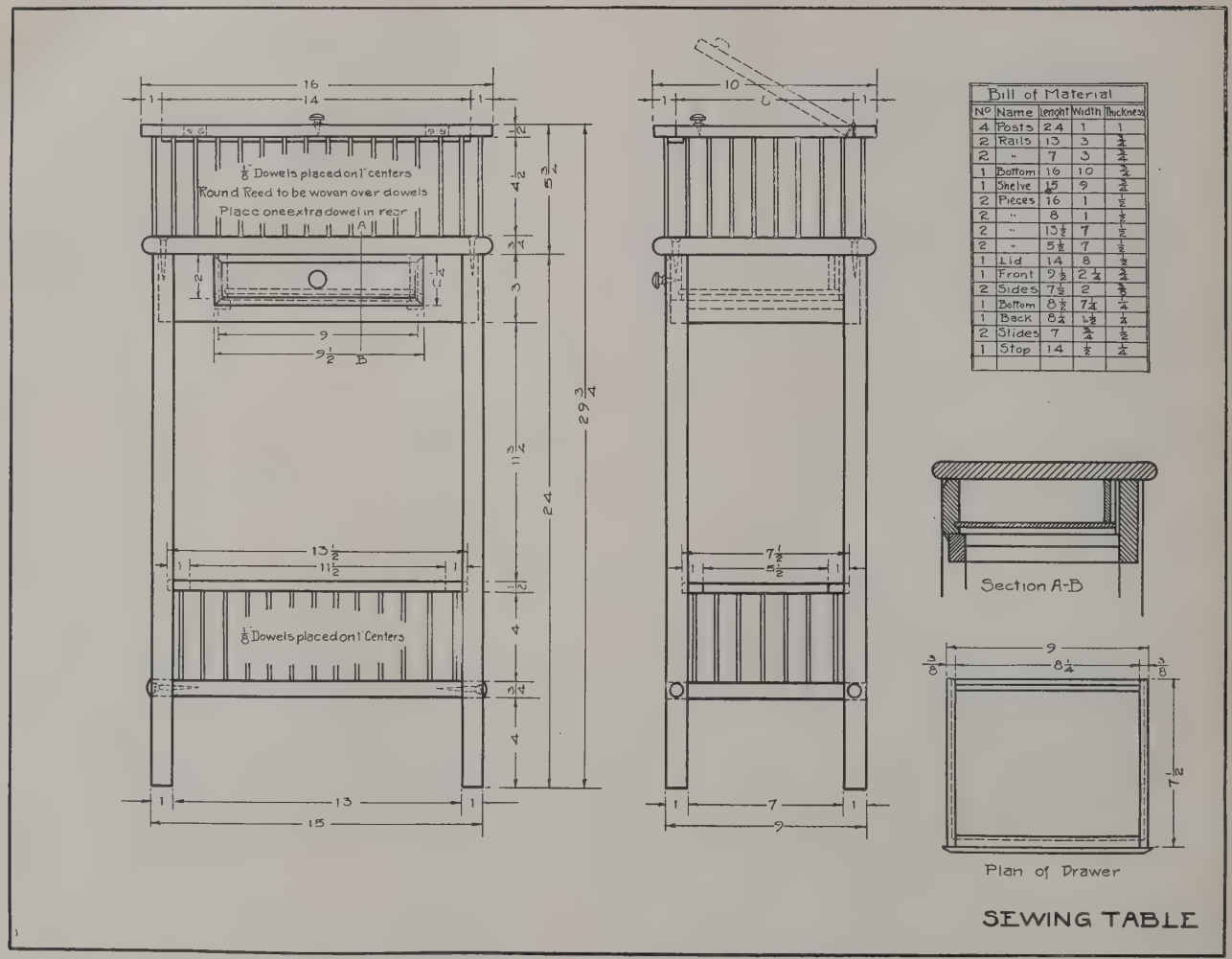


Fig. 261—Working Drawing of Sewing Table (Eighth Grade)

CHAPTER IX

Textiles and Wood

Heretofore very little has been done in the combination of hand-woven textiles and wood, yet there is no combination of materials that gives such a large variety of artistic effects as this one. The different ways in which this material can be used, in combination with wood, are too numerous to mention; therefore, we shall take only those simple problems which are within the capabilities of a sixth-, seventh-, or eighth-grade boy.

Foot Stool

The first problem that we suggest is that of a small foot stool, upholstered in hand-woven material. Fig. 263 shows the working drawing of this unique, but simple, little foot stool, and illustrates the wide possibilities for individual design. Here is a problem that a whole class can construct, and no two made alike. We have given a few suggestions as to how the design of the legs of the stool can be altered or enlarged upon. The size of the stool itself can be changed with pleasing results by making it longer, lower, or narrower, so that there is any number of ways of changing the design of this stool without losing any of its artistic qualities. It is a most flexible problem.

After the stool is constructed, upholster it with a piece of hand-woven material. This may be either woven by the boy himself or by the girls in the weaving class of the school. Here again are more possibilities for making each piece more individual, since each piece of material may be of a different pattern, yet all may be woven from the same threading on the same loom.

This material might be used wherever upholstering is possible, on any of the articles mentioned in the foregoing chapters with most pleasing and beautiful results. A little touch of hand-woven material gives to any article upon which it is used a most subtle appearance.

Fig. 264 shows the completed stool made from the working drawing shown in Fig. 263. The design used for weaving the material used in upholstering this stool is one of the many possible ones of the Rose Path pattern.

Waste Basket

Fig. 265 shows the working drawing of a very simple waste basket that any sixth-grade boy could build without much difficulty, the only difficulty being in boring the holes at the proper angle.

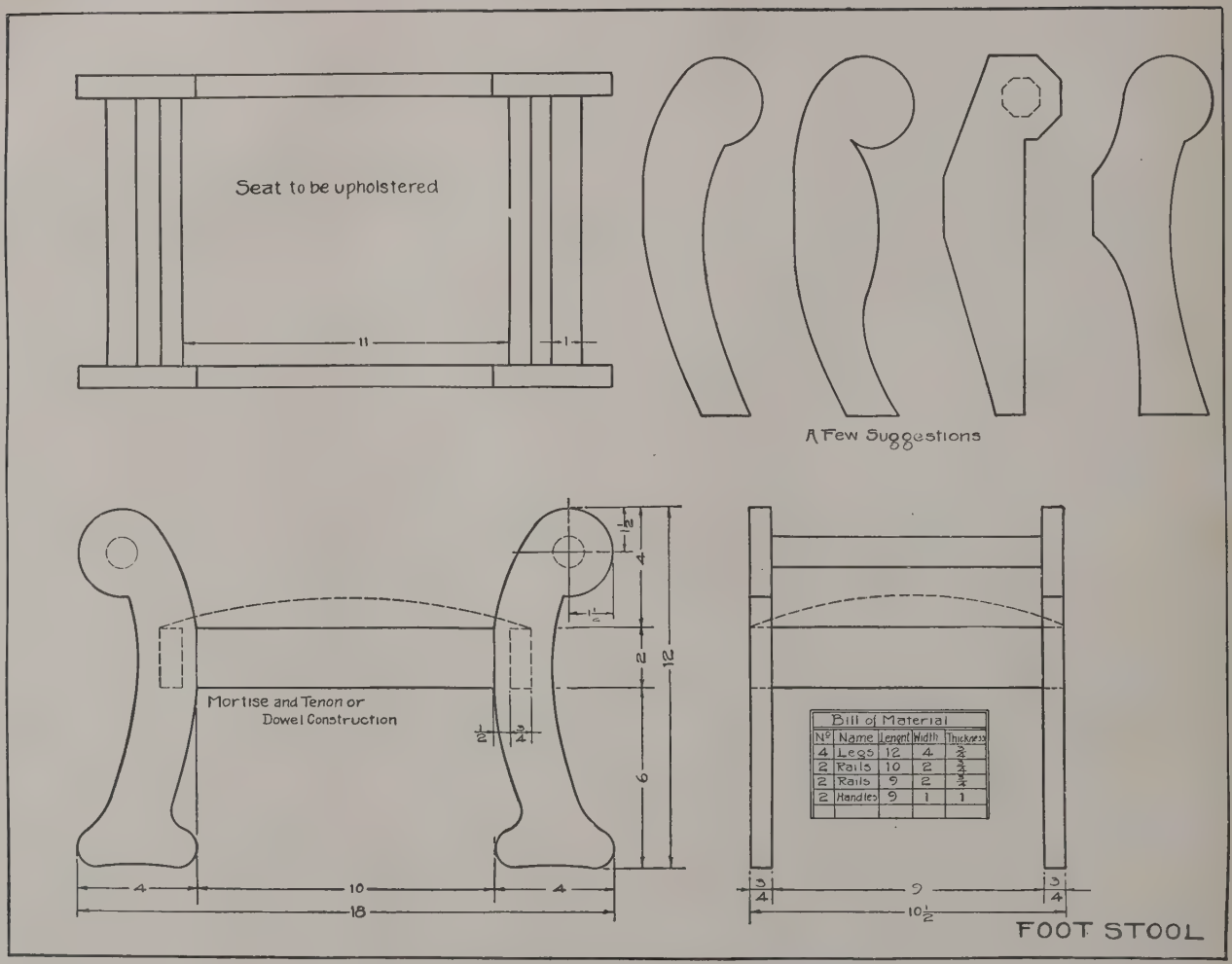


Fig. 263—Working Drawing of Upholstered Foot Stool

Two pieces of cloth are taken the length of two sides and the bottom. Hems are sewed at both ends so that when the dowel rods are placed through the hems and then put in place the cloth will hold the basket together. It is necessary to have the cloth stretched very tight in order to have the basket rigid.

Fig. 265 shows the finished waste basket, the border around the top of the cloth being woven with the Rose Path pattern.

If the tapering of the sides of the waste basket seems too difficult, a straight sided sewing basket

Fig. 264—Finished Foot Stool

Fig. 265—Finished Waste Basket

may be constructed as shown in Fig. 267. The construction is the same as for the waste basket. The design of the hand-woven cloth is another possibility of the Rose Path pattern.

Screens

There is no article of furniture in which hand-woven cloth can be used so effectively as in a screen. Fig. 268 shows the working drawing of a screen in which the panels are of hand-woven material.

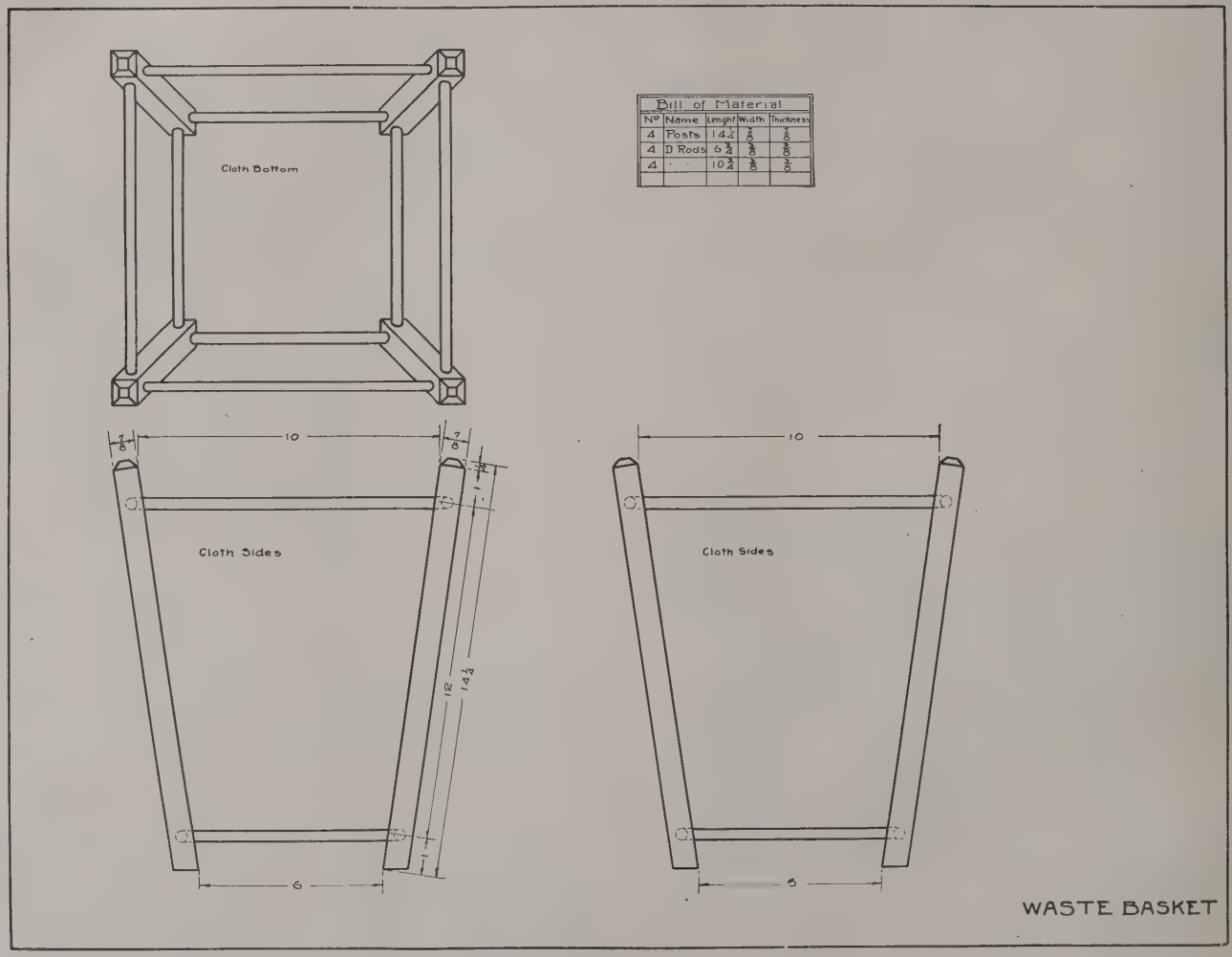


Fig. 266—Working Drawing of Waste Basket

The inner sides of each frame are grooved the same as for a wooden panel; a key is made to fit loosely into this groove. The cloth is placed over the groove, the key is placed on top the cloth over the groove, and then is forced down into the groove. This makes a very good way of fastening the cloth to the frames. A few finishing nails may be driven through the key into the frame to hold the key in place.

That this combination makes a beautiful as well as useful piece of furniture can be seen from the photograph shown in Fig. 269. The cloth is woven from the Orange Peel pattern, a border being woven at the top and bottom to break up the space.

Though the construction of this screen is simple, we feel that it should be made as a group problem rather than an individual one, the boys to make the frame and the girls to weave the cloth.

Fig. 270 shows the working drawing of another very attractive screen of different construction from the first one mentioned. In this screen build the inside frames, as shown, of any lumber, then cover both front and back with the cloth, tacking it along the outside edges of the frames. Make the grooved strips, as shown, and tack them on the outside edges of the frame, covering up the edges upon which the cloth has been tacked. This gives a very neat and effective finish to the screen, since all of the frame that shows is the little grooved moulding on the outside edges.

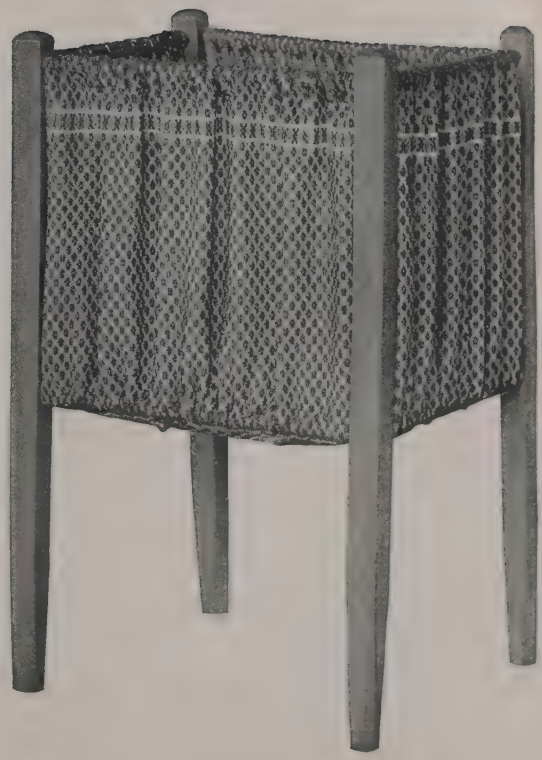


Fig. 267—Finished Sewing Basket

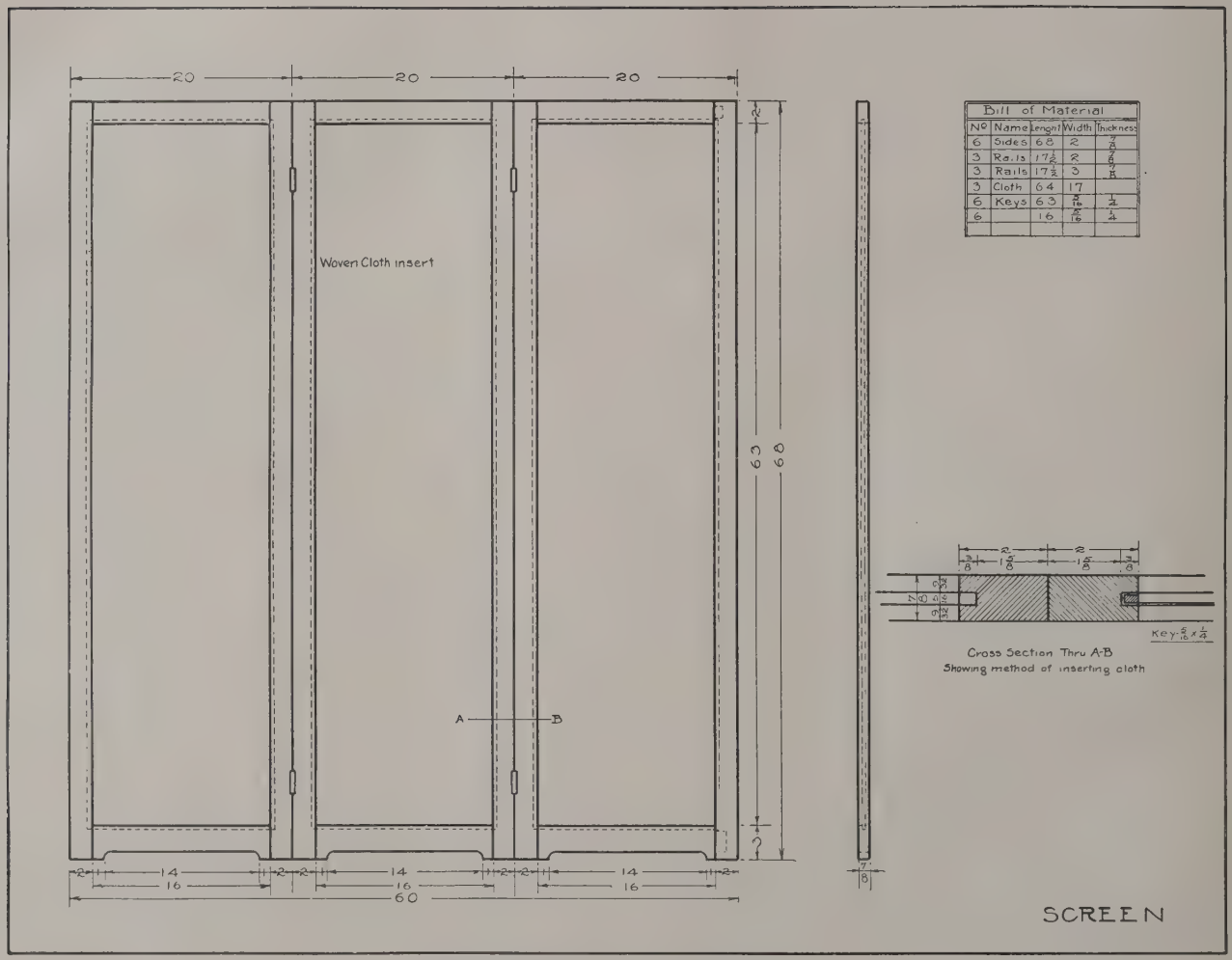


Fig. 268—Working Drawing of Screen

Fig. 269—Finished Screen

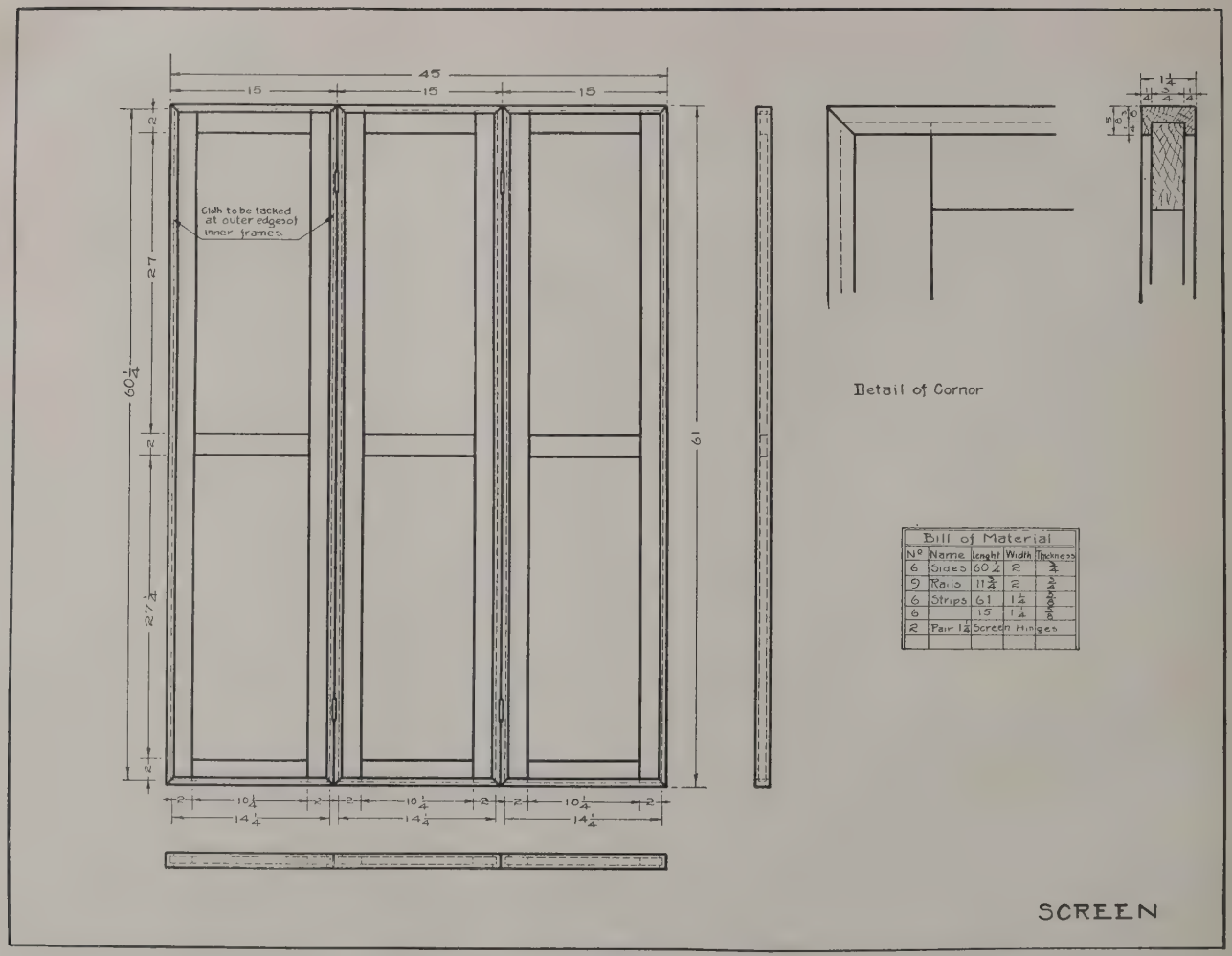


Fig. 270—Working Drawing of Screen

Fig. 271—Finished Screen

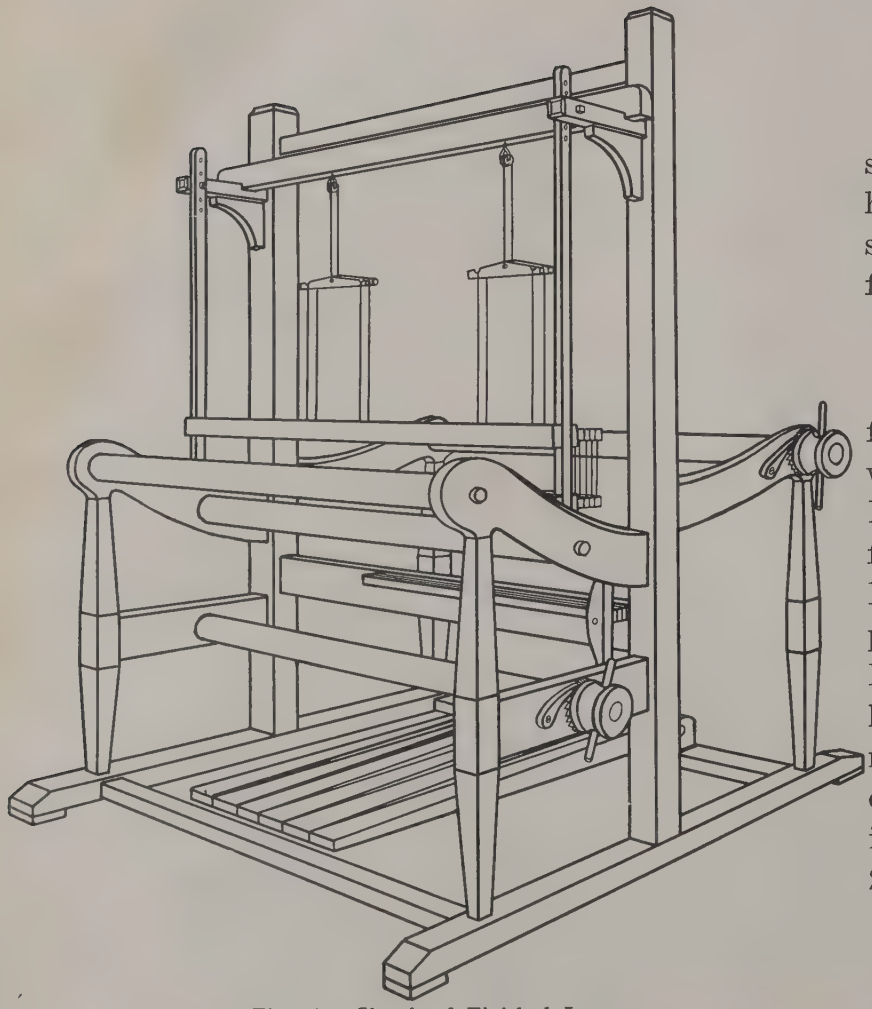


Fig. 272—Sketch of Finished Loom

Fig. 271 shows how attractive this kind of a screen can be made to look by just using strips of hand-woven cloth, embroidered with rope silk. Observe how beautifully the panels are broken by skilful designing.

Looms

The following cuts show the working drawings for both the Danish and Swedish looms. If light work only is desired, then the Danish loom shown in Fig. 272 is the loom to construct. Fig. 273 shows the front working drawing. Fig. 274 shows the side and Fig. 275 shows the detail drawings of the various parts. Fig. 276 shows the completed Swedish loom. If space is available this is the loom to have. On this loom may be woven very fine articles, as well as Colonial rugs. On the Danish loom only the lighter work can be successfully woven. Fig. 277 shows the working drawing for the front of the Swedish loom. Fig. 278 shows the side, and Fig. 279 the detail drawings.

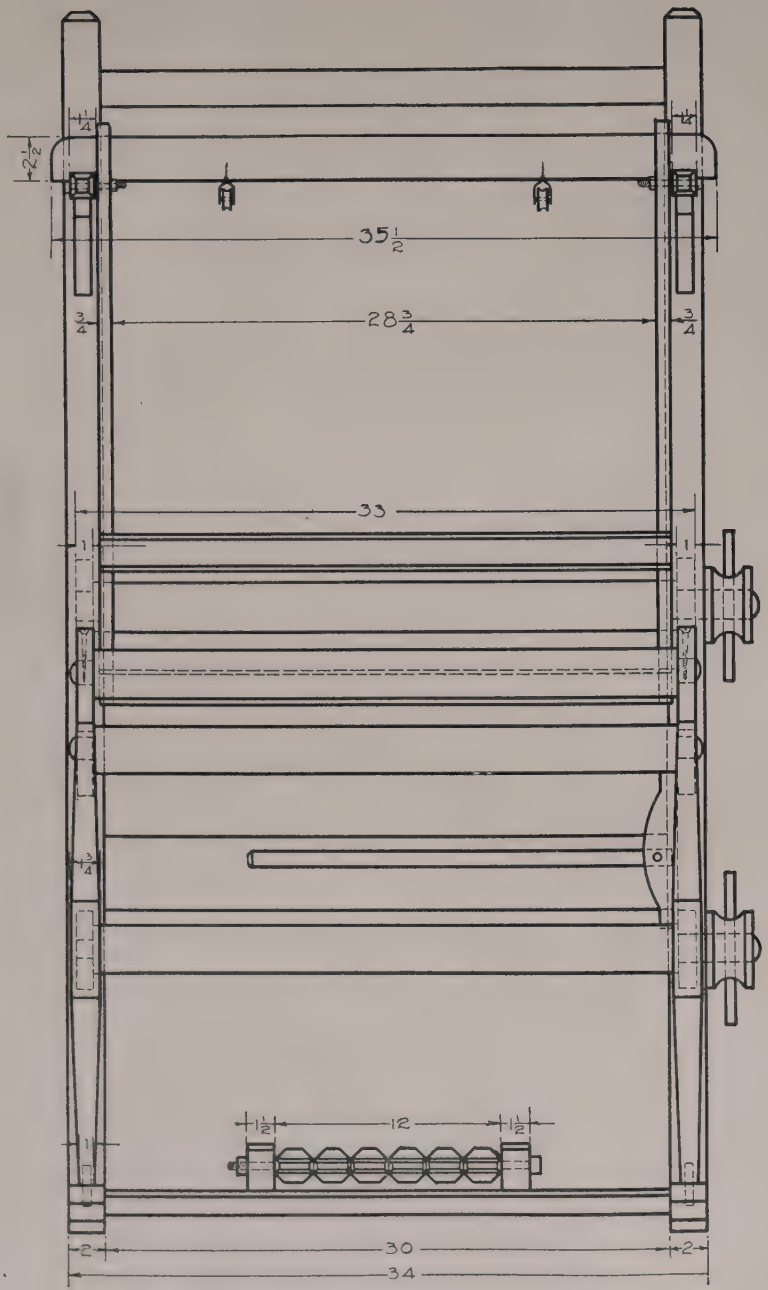


Fig. 273—Working Drawing of Loom—Front View

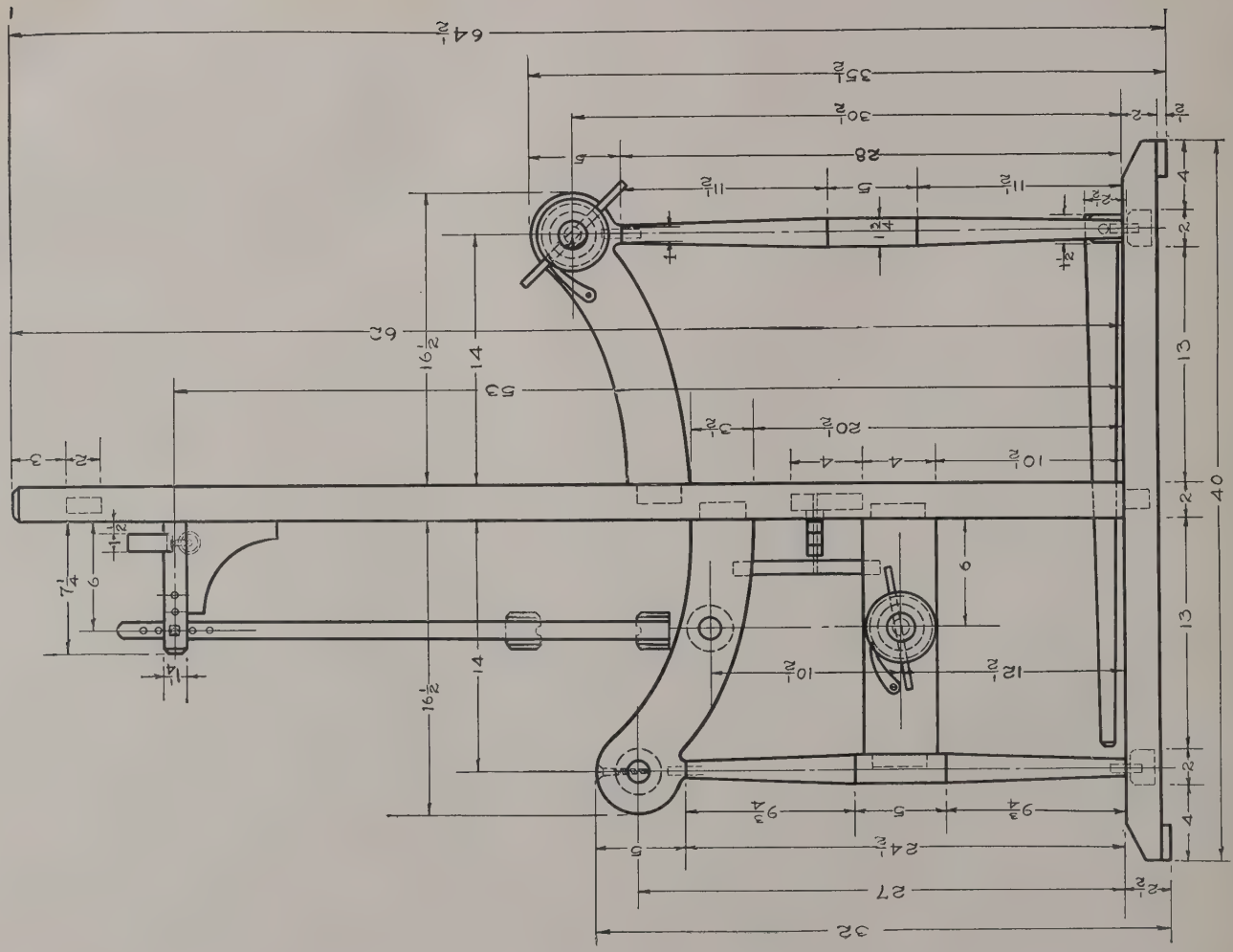


Fig. 274—Working Drawing of Loom—Side View

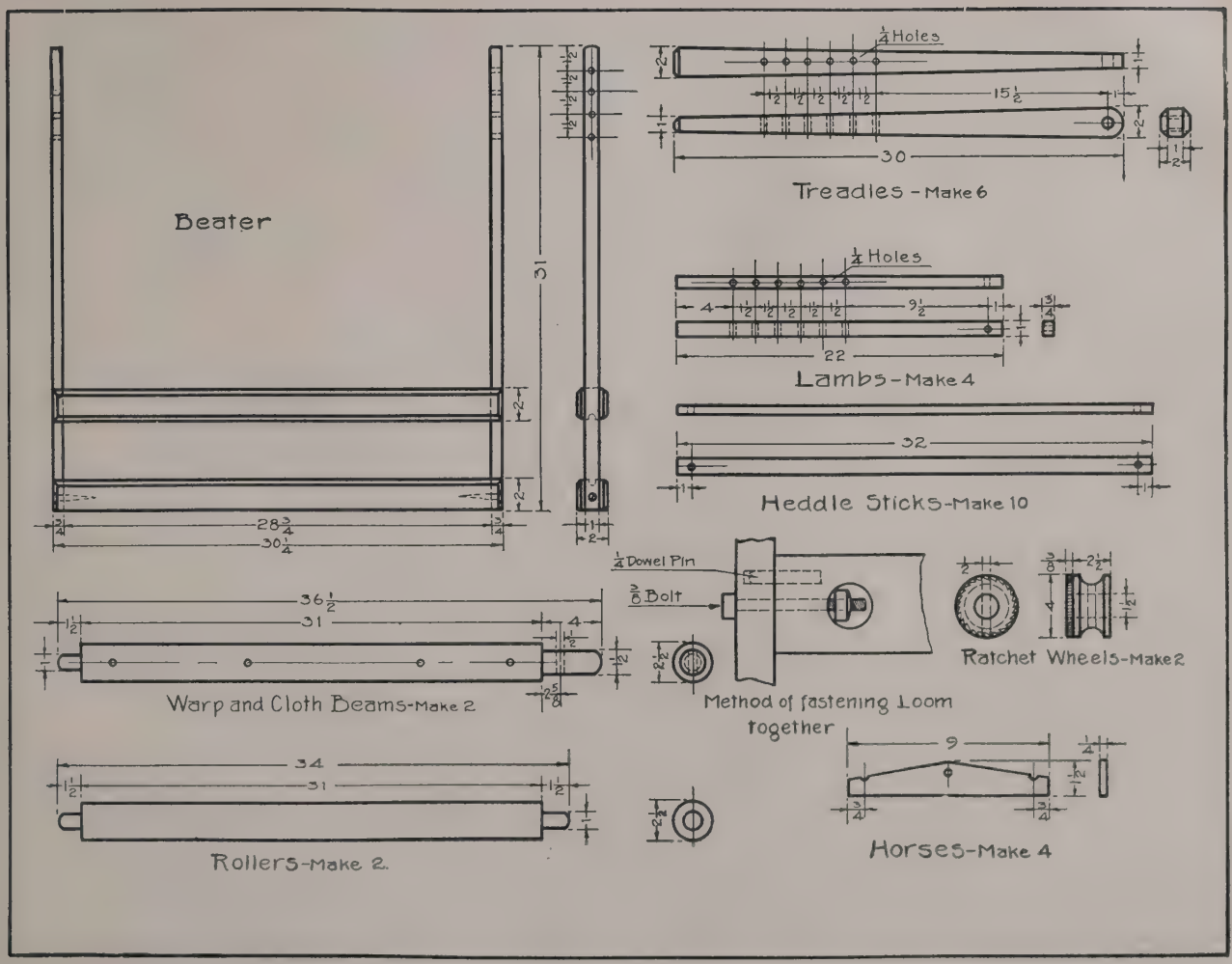


Fig. 275—Working Drawing of Loom—Details

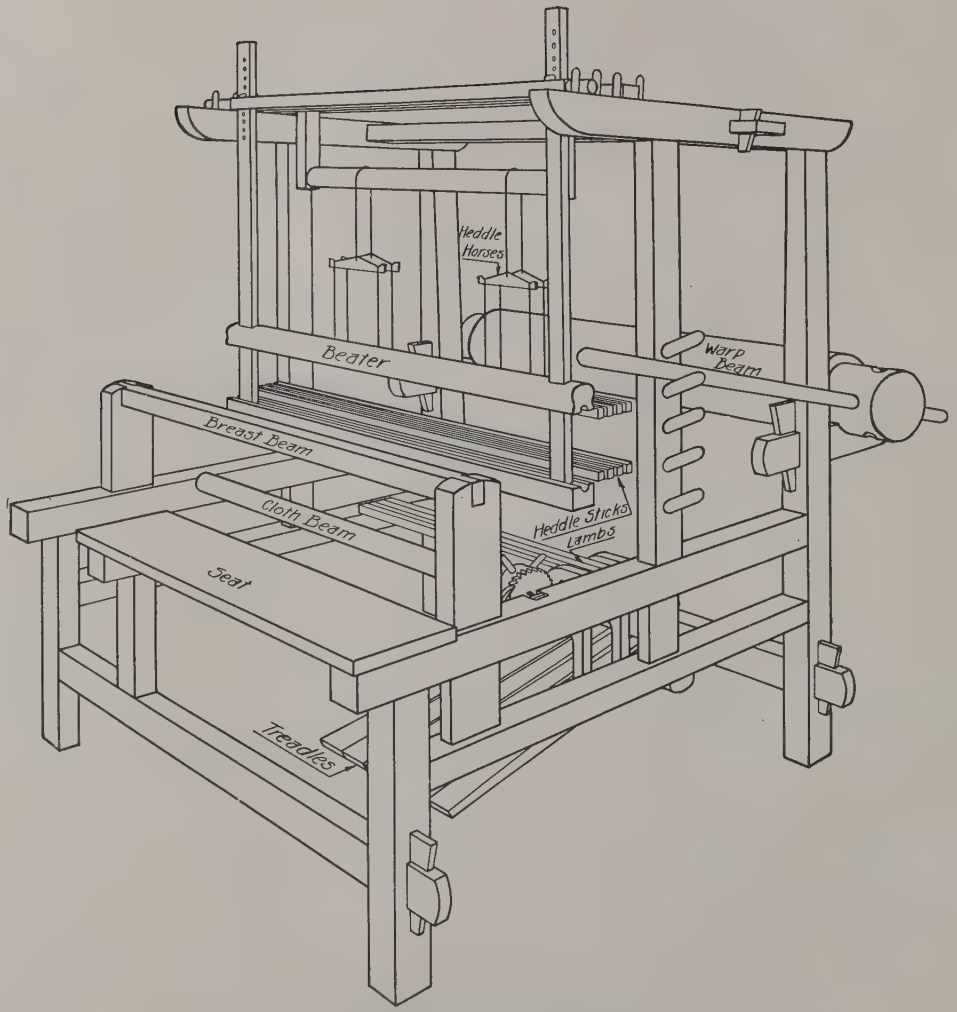


Fig. 276—Sketch of Swedish Loom

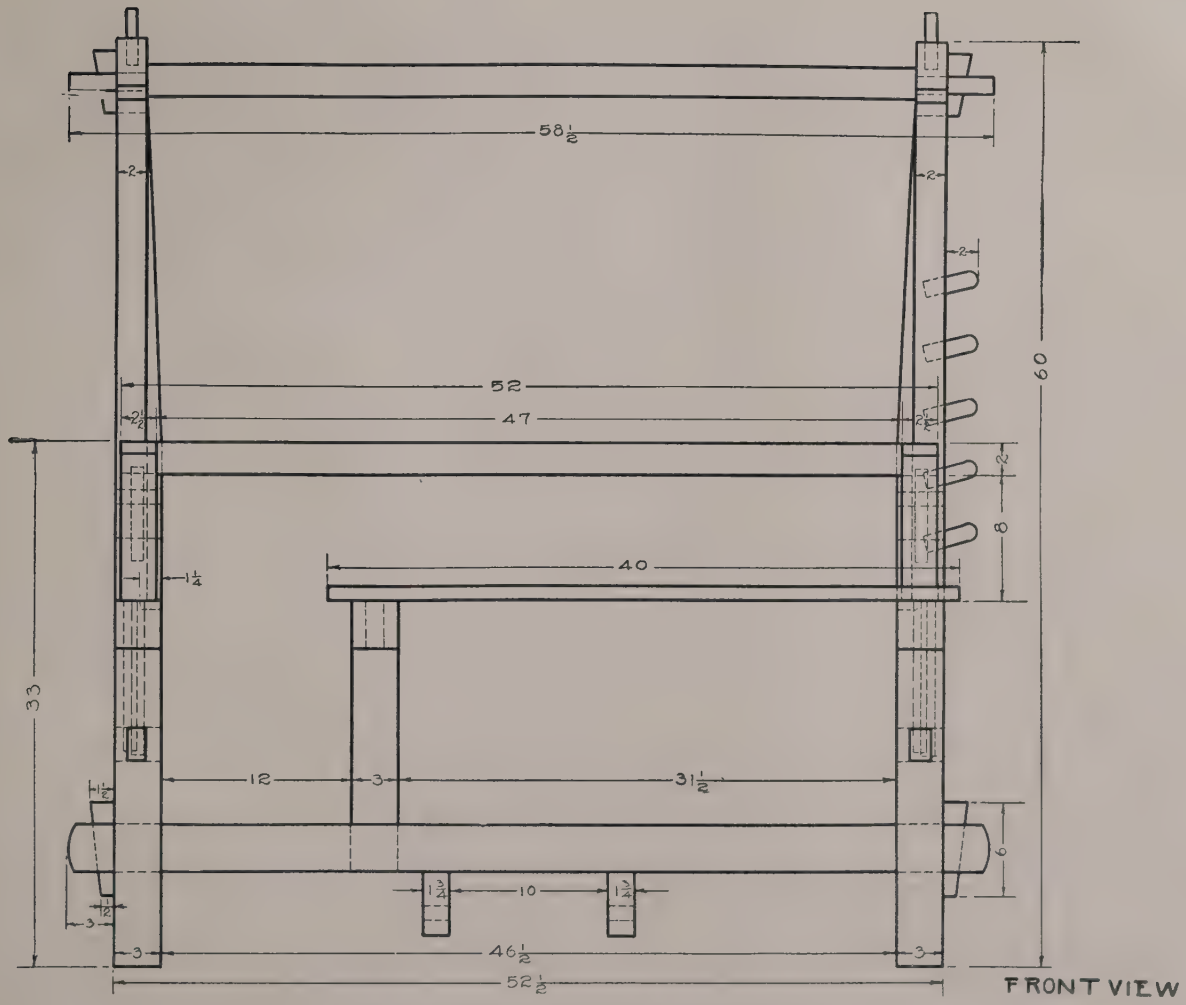


Fig. 277—Working Drawing of Swedish Loom

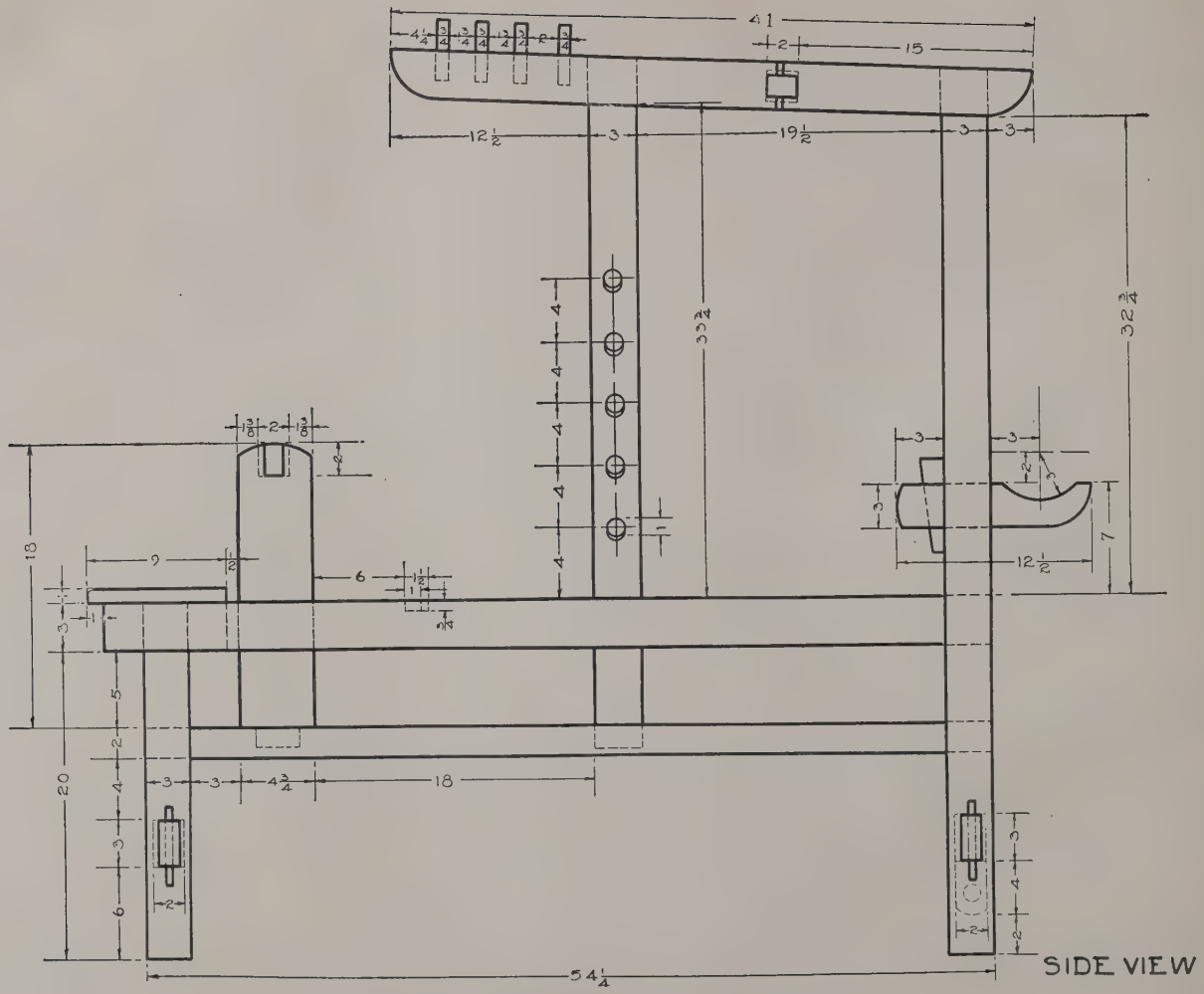


Fig. 278—Working Drawing of Swedish Loom

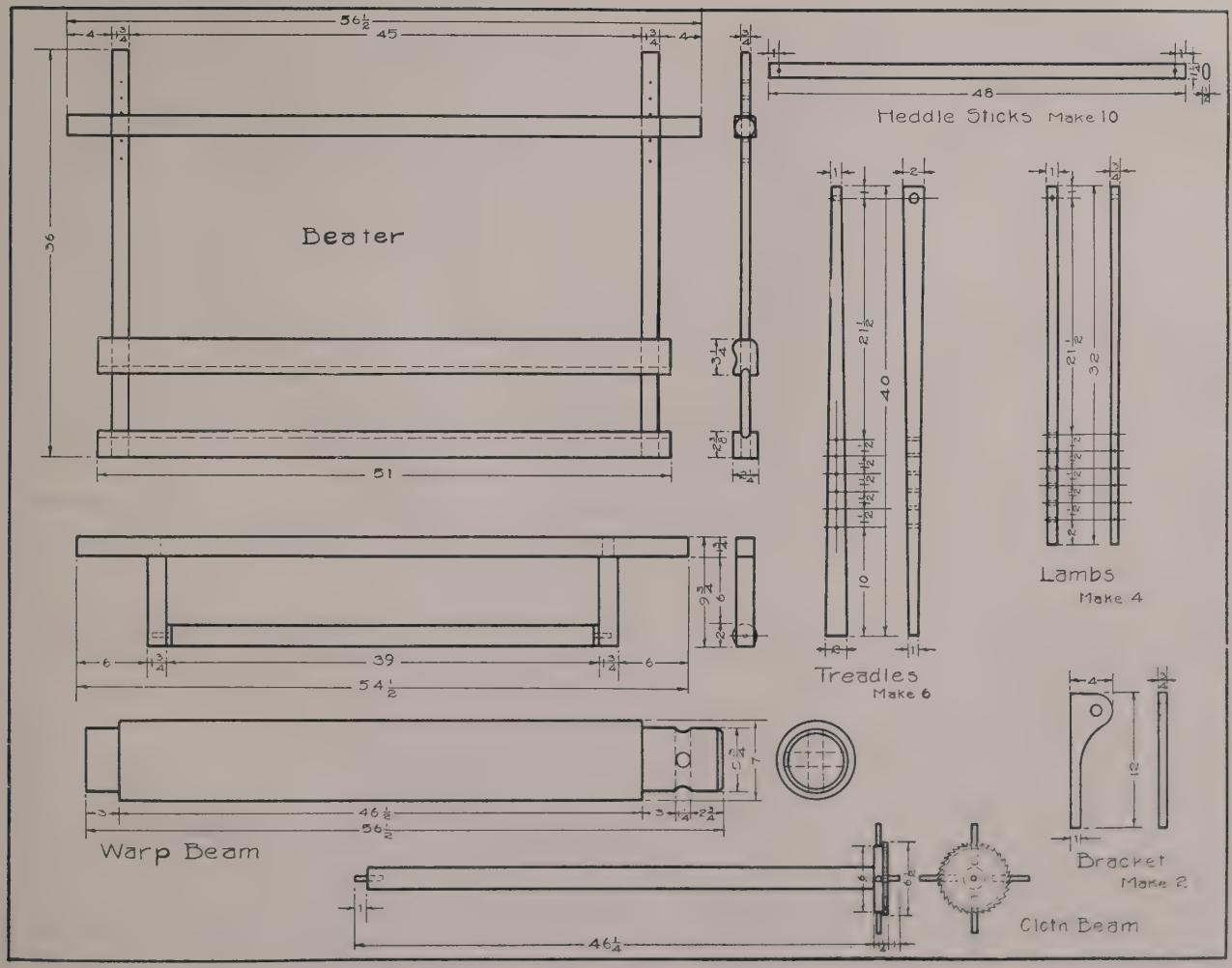


Fig. 279—Working Drawing of Swedish Loom—Details

APPENDIX

Lumber Price Table

To aid the instructor in getting rapidly the price of lumber, we have compiled the tables on the following pages. In order not to have too many of these plates we have considered only lumber ranging from 1 in. to 12 in. in width, 1 ft. to 12 ft. in length and $30 to $100 per thousand in price.

The prices of the lumber have been taken only in full numbers, ranging from 3 cents to 10 cents per square foot—that is, we consider lumber at $38 per M as 4 cents per foot, $43 per M as 5 cents per foot and $75 per M as 8 cents per foot, dropping the fraction when less than ½ and counting the fraction as 1 when ½ or over.

We need not take into consideration the thickness of the lumber, since the price is different for each different thickness.

To illustrate the tables, let us take for example the following pieces of wood and find the price of each from the tables:

3 pieces ¾″x6″x3′ 4″ of Oak at $54 per M.
4 pieces ⅝″x10″x2′ 3″ of Poplar at $40 per M.
8 pieces 1″x7¾″x1′ 6″ of Bass at $28 per M.
2 pieces 1″x3″x5′ 0″ of Oak at $58 per M.

This will easily revert into the following:

1 piece 1″x6″x10′ 0″ at 5c per foot.....25c
1 piece 1″x10″x9′ 0″ at 4c per foot.....30c
1 piece 1″x8″x12′ 0″ at 3c per foot.....24c
1 piece 1″x3″x10′ 0″ at 6c per foot.....15c
Total 94c

To find the price of a 1″x6″x10′ at 5c per foot we turn to the table marked 5c, the price being in the upper left hand corner of each table. The figures in the column directly under the price designate the length in feet, while the figures in the top row directly opposite the price designate the width and thickness of the boards.

Go over to 1″x6″ in the top row and then down this column until you come to the row marked 10, which means 10 ft. in length, and there is the price, 25 cents. Do the same for the other pieces, using the table corresponding to the price of the lumber.

If the stock is over 1 in. in thickness, find the price at 1 in. in thickness and then multiply this price by the actual thickness. For example, take a piece 1½″x4″x8′ at 9 cents per foot. If it were 1 in. instead of 1½ in. in thickness it would cost 24 cents, so take 1½ times 24 cents and you will have the price, which is 36 cents. This is for use when the price is given per board foot instead of square foot.

3¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	.003	.005	1	1	1	2	2	2	2	3	3	3
2	.005	1	2	2	3	3	4	4	5	5	6	6
3	1	2	2	3	4	5	5	6	7	8	8	9
4	1	2	3	4	5	6	7	8	9	10	11	12
5	1	2	4	5	6	8	9	10	12	13	14	15
6	2	3	5	6	8	9	11	12	14	15	17	18
7	2	4	5	7	9	11	12	14	16	18	19	21
8	2	4	6	8	10	12	14	16	18	20	22	24
9	2	5	7	9	11	14	16	18	20	22	25	27
10	3	5	8	10	13	15	18	20	23	25	28	30
11	3	6	8	11	14	17	19	22	25	27	30	33
12	3	6	9	12	15	18	21	24	28	30	33	36

4¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	.003	1	1	1	2	2	2	3	3	3	4	4
2	1	1	2	3	3	4	5	5	6	7	8	8
3	1	2	3	4	5	6	7	8	9	10	11	12
4	1	3	4	5	7	8	9	11	12	14	15	16
5	2	3	5	7	8	10	12	14	15	17	18	20
6	2	4	6	8	10	12	14	16	18	20	22	24
7	2	5	7	9	12	14	16	19	21	24	26	28
8	3	5	8	11	14	16	19	21	24	27	30	32
9	3	6	9	12	15	18	21	24	27	30	33	36
10	3	7	10	14	17	20	24	27	30	34	37	40
11	4	8	11	15	18	22	26	30	33	37	40	44
12	4	8	12	16	20	24	28	32	36	40	44	48

5¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	.004	1	1	2	2	3	3	3	4	4	5	5
2	1	2	3	3	4	5	6	7	7	8	9	10
3	1	3	4	5	6	8	9	10	11	13	14	15
4	2	3	5	7	8	10	12	14	15	17	18	20
5	2	4	6	8	11	13	15	17	19	21	23	25
6	3	5	8	10	13	15	17	20	23	25	27	30
7	3	6	9	12	15	17	20	24	27	29	32	35
8	3	7	10	14	17	20	24	27	30	33	36	40
9	4	7	11	15	19	23	27	30	34	38	41	45
10	4	8	13	17	21	25	29	33	38	42	46	50
11	5	9	14	18	23	27	32	36	41	46	50	55
12	5	10	15	20	25	30	35	40	45	50	55	60

6¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	.005	1	2	2	3	3	4	4	5	5	6	6
2	1	2	3	4	5	6	7	8	9	10	11	12
3	2	3	5	6	8	9	11	12	14	15	17	18
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7	4	7	11	14	18	21	25	28	32	35	39	42
8	4	8	12	16	20	24	28	32	36	40	44	48
9	5	9	14	18	23	27	32	36	41	45	50	54
10	5	10	15	20	25	30	35	40	45	50	55	60
11	6	11	17	22	28	33	39	44	50	55	61	66
12	6	12	18	24	30	36	42	48	54	60	66	72

7¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	.006	1	2	2	3	4	4	5	5	6	6	7
2	1	2	4	5	6	7	8	10	11	12	13	14
3	2	4	5	7	9	11	12	14	16	18	19	21
4	2	5	7	9	12	14	16	19	21	24	26	28
5	3	6	9	12	15	18	20	24	27	29	32	35
6	4	7	11	14	17	21	25	28	32	35	39	42
7	4	8	12	16	20	25	29	33	37	41	45	49
8	5	10	14	19	24	28	33	38	42	47	52	56
9	5	11	16	21	27	32	37	42	47	53	58	63
10	6	12	18	24	29	35	41	47	53	58	64	70
11	6	13	19	26	32	39	45	52	58	64	70	77
12	7	14	21	28	35	42	49	56	63	70	77	84

8¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	.007	1	2	3	3	4	5	5	6	7	8	8
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4	3	5	8	11	14	16	19	22	24	27	30	32
5	3	7	10	14	17	20	24	27	30	34	37	40
6	4	8	12	16	20	24	28	32	36	40	44	48
7	5	9	14	19	24	28	33	37	42	47	52	56
8	5	11	16	22	27	32	37	42	48	53	58	64
9	6	12	18	24	30	36	42	48	54	60	66	72
10	7	14	20	27	34	40	47	53	60	67	73	80
11	8	15	22	30	37	44	52	58	66	73	80	88
12	8	16	24	32	40	48	56	64	72	80	88	96

9¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	1	2	2	3	4	5	5	6	7	8	8	9
2	2	3	5	6	7	9	11	12	14	15	17	18
3	2	5	7	9	11	14	16	18	20	23	25	27
4	3	6	9	12	15	18	21	24	27	30	33	36
5	4	8	12	15	19	23	27	30	34	38	41	45
6	5	9	14	18	23	27	32	36	41	45	50	54
7	5	11	16	21	27	32	37	42	47	53	58	63
8	6	12	18	24	30	36	42	48	54	60	66	72
9	7	14	20	27	34	41	47	54	61	68	75	81
10	8	15	23	30	38	45	53	60	68	75	83	90
11	8	17	25	33	41	50	58	66	74	83	91	99
12	9	18	27	36	45	54	63	72	81	90	99	108

10¢	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8	1x9	1x10	1x11	1x12
1	1	2	3	3	4	5	6	7	8	8	9	10
2	2	3	5	7	8	10	12	14	15	17	18	20
3	3	5	8	10	13	15	18	20	23	25	28	30
4	3	7	10	14	17	20	24	27	30	34	37	40
5	4	8	13	17	21	25	29	34	38	42	46	50
6	5	10	15	20	25	30	35	40	45	50	55	60
7	6	12	18	24	29	35	41	47	53	58	64	70
8	7	14	20	27	33	40	47	53	60	67	73	80
9	8	15	22	30	38	45	53	60	68	75	83	90
10	8	17	25	34	42	50	58	67	75	84	92	100
11	9	18	28	37	46	55	64	73	83	92	101	110
12	10	20	30	40	50	60	70	80	90	100	110	120

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